

ANNALS OF SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE.

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JANUARY, 1904

No. 1

ORIGINAL MEMOIRS.

ON REMOVAL, AFTER SUPRAPUBIC CYSTOTOMY, OF THE PROSTATE AND OF THE PROS- TATIC URETHRA FOR SENILE EN- LARGEMENT OF THE PROSTATE.

WITH A LIST OF TWELVE CASES.

BY B. G. A. MOYNIHAN, M.S., F.R.C.S.,
OF LEEDS.

DURING the last two years I have operated upon a series of cases, twelve in number, of senile enlargement of the prostate, by removing the prostate and the prostatic urethra. The first operation of this kind was done on September 3, 1901. In this case, while shelling out the prostate from its capsule, I was conscious of the extreme ease with which the separation of the gland took place. When the enucleation was approaching completion at the posterior part, the last few movements of my finger resulted, suddenly and quite unexpectedly, in the whole gland becoming free and lying loose in the bladder. On removing and examining the gland I found that I had removed the prostate and the whole of the prostatic urethra as one complete whole. I was amazed at this, and not a little fearful as to what the ultimate issue of the case might prove to be. Within five weeks the suprapubic wound had completely healed, and the patient was, and still is, able to pass his urine

in a perfectly natural manner. There is not, nor has there ever been, any incontinence, nor any undue frequency, nor any disability. The method in this case was not one to be imitated deliberately until the event proved it to be wholly satisfactory. When I was assured that all was well with the patient I was emboldened to put the operation to a further proof, and this I have done in eleven subsequent cases. Two of the patients have been medical men. Of the twelve cases one has proved fatal. The ages of the patients have been fifty-nine, sixty-six, fifty-six, sixty, fifty-seven, sixty-six, sixty, seventy-three, seventy-two, sixty-five, seventy-three, and sixty-eight. In four of them a stone has been found, and upon one of these patients a suprapubic operation had been performed for stone fourteen years before by Mr. Berkeley Hill.

The operation is carried out in the following way:

The bladder is washed out thoroughly with a solution of carbolic acid, 1 per cent., and finally filled with ten or twelve ounces of this fluid. A rubber glove is worn on the right hand, so that after the rectal manipulations are over the removal of the glove may leave a clean hand with which to continue the operation. The bladder is now opened above the pubes and the left forefinger introduced. The lotion is allowed to escape from the bladder. It will be found that a better impression is gained of the nature and extent of the prostatic enlargement when the bladder is empty than when it is distended with fluid. The bladder wall at the incision is then seized on each side and a silkworm-gut suture is passed through the whole thickness of the abdominal wall and through the cut edge of the bladder, tied and left long. This fixing of the bladder to the wound prevents any undue tearing or stripping of the bladder by the subsequent manipulations. The sutures are allowed to remain for three days and are then cut away. By this time the bladder will be found fixed firmly to the hinder surface of the abdominal wall. With the left forefinger in the bladder, a snip is then made with a pair of sharp-pointed scissors into the mucous membrane of the trigone, immediately behind the internal meatus of the urethra. The tip of the

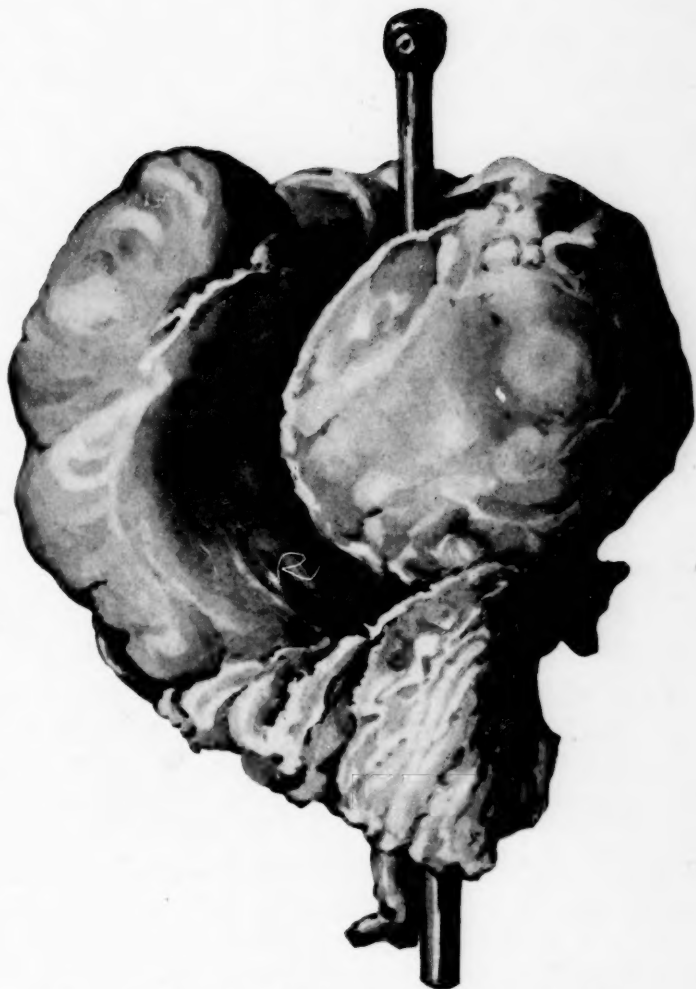


FIG. 1.—Drawing (actual size) of prostate removed in Case 8. Weight, six and one-half ounces.

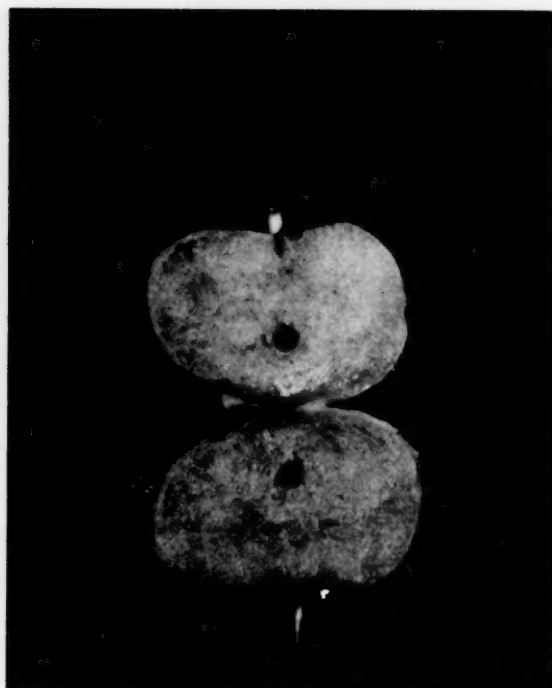


FIG. 2.—Transverse section of prostate removed in Case 1, showing the urethra.

finger then deepens and gradually enlarges this small opening until the mucous membrane is felt to be loosened a little. Two fingers of the right (gloved) hand are then passed into the rectum and between these and the thumb pressed into the perineum, the prostate is firmly held while, with the left forefinger, the stripping of the prostate is commenced. This is generally very easily accomplished. The surface of the lobes is rapidly cleared; the opening in the mucous membrane is torn larger until it completely encircles the internal meatus, and, finally, the anterior portion of the prostatic urethra at its junction with the membranous portion is torn through after the prostate is elsewhere entirely free. The enucleation is easily and rapidly performed, as a rule, in from two to five minutes. The larger the prostate the easier the stripping. The fingers of the right hand are now removed from the rectum, the glove stripped off by an assistant, and a pair of vulsellum forceps passed into the bladder to seize and remove the loosened prostate. There is very little bleeding, as a rule, though in two instances there has been free hæmorrhage for twenty to thirty minutes. A catheter is now passed and the bladder freely flushed with hot sterile salt solution, or what is better, because of its anæsthetic effect, a 1 per cent. solution of carbolic acid. When the fluid returns almost clear, a large rubber tube is passed into the bladder, and a couple of stitches introduced into the wound. After the prostate is completely removed, it is astonishing to find what a very small gap seems to be left in the base of the bladder. The interval so left is only about one-quarter the size that an inspection of the gland would lead one to expect. There are often extremely severe pains, paroxysmal in character, for a few hours after the operation, and the patient frequently complains of the insistent and compelling desire to pass water. A morphine suppository or a small hypodermic injection of morphine will give comparative ease, and in feeble old folk may safely and wisely be given.

At the end of forty-eight hours the tube is removed from the bladder, and the patient is allowed to sit up with the bed-rest. On the fourth day, and on each succeeding day, a cathe-

ter is passed, and the bladder is freely washed with dilute carbolic acid lotion. On the seventh day the catheter is tied in and a drag is placed upon the suprapubic wound. Every morning the drag is removed and the bladder again flushed; the catheter is not removed for five or six days, and a new one is then introduced. At each flushing of the bladder a few small sloughs can be picked away with dissecting forceps from the suprapubic wound. The catheter as it lies in the bladder may drain at once into a bottle, or a long fine drainage tube may be attached to the catheter, and lead into a bottle tied to the side of the bed.

If the patient be a feeble old man, it is advisable to vary this treatment by allowing him to get up and sit in a chair before the end of the first week. He may then be kept in bed with the catheter tied in on one day, and on the alternative days be allowed to sit up. The urine ceases to come through the wound about the end of the third week, and by the end of the fourth week, or occasionally not until the end of the fifth week, the patient is passing urine spontaneously, at natural intervals, without discomfort or difficulty, and the wound is entirely closed. If there has been cystitis, I generally order urotropine or helmitol to be given in ten to fifteen grain doses thrice or four times daily.

The question as to the priority in the method of enucleation of the prostate has been over-much discussed in the medical journals during the last few years. That Mr. McGill and Mr. Atkinson, of Leeds, employed enucleation there can be no question; but that all surgeons in Leeds and elsewhere temporarily abandoned the method, in their worship of false gods by the performance of castration and vasectomy, there can also be no doubt. To Mr. Freyer belongs, at the least, the credit of calling us back to the rational surgical treatment of enlargement of the prostate. He claimed to be able to enucleate the whole of the prostate, leaving the urethra intact. Whether actually the whole of the prostate is removed in his operation, or whether a portion remains behind with the capsule or sheath, is a matter of little more than academic interest. Certainly all

the prostate that matters is removed. He, and other surgeons as well, may be content to leave the question of priority to be determined by posterity. The method adopted by myself in this series of cases consists of the removal of the whole or of what may count as the whole prostate, with the prostatic urethra, in one mass.

The after-treatment of the cases requires considerable expenditure of time. The bladder is washed out daily with five or six pints of a 1 per cent. solution of carbolic acid, and the wound is picked clean at each flushing. In two cases, where the cystitis was excessively severe and the urine most foul, after the bladder had been washed out, a stream of oxygen was passed through the catheter, and the bladder, as it were, washed out with oxygen. Over the suprapubic wound a tight-fitting impervious cap was placed, having a small leak to allow of the escape of the gas. In this way the healing of the wounds was certainly hastened.

Operations upon all patients suffering from the complications of senile enlargement of the prostate are necessarily serious. All the patients are over fifty-five, and all of them must have suffered in greater or less degree from some of the complications, retention, inability to pass urine, dependence, partial or complete, upon the catheter, cystitis, or hæmaturia before operation was recommended. It is, as a rule, only in the cases where catheter life is impossible or has ceased to be a relief that operation is advised. Many of the patients are broken in health from loss of sleep, loss of appetite, and constant anxiety as to their condition. They have all suffered the misery of catheterism. The patients are, therefore, almost without exception bad subjects for operation; but notwithstanding this, their recovery after operation is rapid and remarkable. It is, as Mr. McGill used to urge, a serious matter to keep these old folks in bed. They should be allowed to sit up within two or three days of the operation, and they should be hedged round with every care and comfort.

SYNOPSIS OF TWELVE CASES OF PROSTATECTOMY.

No.	Date, Name, Age.	History and Present Condition.	Operation and Description.	Result.	Remarks.
1	September 3, 1901. C. Leeds. Fifty-nine.	Symptoms for three years. Twice retention. Catheter passed frequently, but not as a routine procedure. Bad cystitis; hamaturia occasionally.	Suprapubic prostatectomy. Gland and urethra removed entire.	R.	Wound healed in fifth week.
2	February 14, 1902. O. Huddersfield. Sixty-six.	Symptoms for four years. Catheter life, two years. Cystitis.	Suprapubic enucleation of prostate and urethra.	R.	Discharged with wound healed in eight weeks.
3	November 19, 1902. Dr. X. Fifty-six.	Symptoms for three years. Partial catheter life, five months. Cystitis, wasting, great misery, and depression.	Gland removed entire with about five-eighths of an inch of urethra.	R.	Wound healed in fifth week. Was at work in ninth week.
4	July 3, 1903. Y. Sixty.	Symptoms for about two years. Partial catheter life. Great frequency and distress. Cystitis. Acute orchitis resulted from catheterism.	Gland removed entire. It is not very much enlarged. All the prostatic and about one-half inch of the membranous urethra came away.	R.	The wound did not heal till the fourteenth week. When the catheter was tied in during the second week, an acute cystitis developed and suppuration occurred.
5	July 3, 1903. Burley. Fifty-seven.	Difficulty from six to seven years. Catheter life absolutely, three years. Has very severe pain. Rectal examination. Moderately enlarged prostate.	Prostate removed entire; the enlargement was limited almost entirely to one lobe. There was also a small stone.	R.	Wound healed in fifth week.

6	July 8, 1903. Hkley.	R.	Many years' history. For eight weeks has been getting up every quarter- or half-hour in the night.	Removed entire. The enlargement only involves one lobe. Three-quarters of an inch of urethra removed.	R.	Wound healed in seventh week.
7	July 14, 1903. Leeds. Sixty.	T.	Eight or nine months' difficulty. Now always has to use catheter.	Gland removed whole. Uniform enlargement. One and one-quarter inches of urethra removed.	R.	Wound healed in sixth week.
8	August 13, 1903. M. York. Seventy-three.		Suprapubic lithotomy fourteen years ago. (Mr. Berkeley Hill.) Prostatic symptoms for ten years. Complete catheter life for three years and nine months. Cystitis and hæmaturia three months.	Gland removed in one piece, with urethra. Weight, six and one-half ounces. Also, a very rough, large stone.	R.	Wound closed on fifteenth day.
9	September 12, 1903. H. G. Hull. Seventy-two.		Catheter life, three years. Worse lately; cannot rest at nights. Very feeble; bad cystitis.	Large gland removed entire with all the prostatic and one-half of an inch of membranous urethra.	R.	Wound healed on twenty-fifth day.
10	September 24, 1903. J. Scarbro'. Sixty-five.		Very feeble. Symptoms for three or four years. Catheter passed every one to two hours. Has failed greatly in health, owing to loss of sleep and loss of appetite.	Gland removed in six pieces; also a large stone.	D.	Not an enucleation similar to the others in this table. Probably the right layer for stripping the capsule away was missed.
11	October 2, 1903. S. Thorne. Seventy-three.		Twelve months' catheter life. Very severe pain before passing.	Large gland removed entire. One and one-half inch of urethra removed. Large stone.	R.	Wound quite healed in three weeks.
12	October 28, 1903. B. Hallifax. Sixty-eight.		Difficulty for four years. Catheter, three years. Cystitis; some bleeding.	Removed entire. One and three-quarters inches of urethra removed.	R.	Passed urine spontaneously on fourteenth day.

INTESTINAL PERFORATION IN TYPHOID FEVER.

BY RICHARD H. HARTE, M.D.,

AND

ASTLEY PASTON COOPER ASHHURST, M.D.,

OF PHILADELPHIA.

ALTHOUGH perforation of the intestines from ulceration has been recognized from early times, as may be seen in the occasional reports of autopsies,¹ yet it was not until about seventy years ago, when typhoid fever became clearly known as an individual disease, that many of these lesions were referred to it as a cause. And not until 1884 was surgical interference suggested as a forlorn hope in snatching a few of these patients from the jaws of death.

It was Leyden who first advocated laparotomy for this condition, and the first recorded operation was done by Mikulicz on April 7, 1884. The patient, a man aged forty years, was suddenly seized, while apparently in perfect health, with symptoms of intestinal perforation. After a lapse of seventy-two hours laparotomy was done through a median incision, and a perforation found and sutured. Pieces of potato were floating about in the man's belly. After a rather tedious convalescence, the patient ultimately recovered (Volkman's *Samml. klin. Vorträge*, No. 262; *Chirurgie*, April, 1884, No. 83). It was an ambulatory form of the disease, the existence of typhoid fever being not apparently suspected before operation. This case has been rejected by some authors as not authentically one of typhoid fever, but it has been accepted by Dr. Keen and by Dr. Finney, among other writers on the subject, and a perusal of the original report leaves no doubt at all in our own minds as to the propriety of including it in the statistics of this operation.

For the first five years only ten of these operations are

recorded, and, indeed, a mortality of 90 per cent. was not at all encouraging. But the sixteen cases subjected to operation during the second lustrum showed a death-rate of 87.5 per cent., while during the period from 1894 to 1898, inclusive, the mortality of the operation had been reduced to 72 per cent. This is probably still the death-rate, although of cases recorded since 1898 less than 70 per cent. have terminated fatally; but no statistician, however enthusiastic, can afford to ignore those cases, mostly fatal, which are never reported at all, and must, therefore, allow a fairly wide margin in drawing conclusions from the figures available.

We have carefully examined in all the records of 362 patients, who, during the course of typhoid fever, submitted to laparotomy for intestinal perforation, or for peritonitis without actual perforation. From our tables we have excluded several cases where an operation was not performed until some time after recovery from typhoid fever, and also a very few cases accepted by previous writers on the subject, in which study of the original records has convinced us that the evidence did not warrant their inclusion. We have freely consulted the works of Keen, of Finney, of Hagopoff, of Miclescu, and of others; also the theses of Mauger, of Junqua, and of others; as well as numerous articles of less extent, among which mention may be made of those by Shattuck, Warren and Cobb, Bontecou, Munro, Monod and Vanverts, Briggs, Cushing, Abbe, Shepherd, Hays, and Hartmann; to all of which we desire to express our indebtedness. We have consulted the original reference in every case in which it was accessible to us, and in other instances have taken pains to indicate the medium of our knowledge.

Perforation of the intestines is said to occur in from 1 to 11 per cent. of cases of typhoid fever. Leibermeister, in 2000 patients, found perforation in twenty-six; Murchison, in 1580 patients, observed it forty-eight times; Griesinger, in 118 noted fourteen perforations; while Flint, in seventy-three cases, found but two (these figures are from Hutchinson, in

Pepper's *System of Medicine by American Authors*, Philadelphia, 1885, Vol. i.). Curschmann, in Nothnagel's *Encyclopædia*, Philadelphia, 1901, found that of 829 patients 2.7 per cent. perforated. Armstrong, in the Montreal General Hospital (ANNALS OF SURGERY, November, 1902), observed among 932 patients an incidence of 3.66 per cent. At the Episcopal Hospital in this city we have examined the records since January 1, 1898, and find that, among 1556 patients treated for typhoid fever in that time, at least thirty-four perforations occurred; and at the Pennsylvania Hospital, among 1793 cases, forty-five perforations are recorded.

These figures may be compendiously seen in the annexed table:

Authority.	Cases.	Perforations.	Percentage.
Leibermeister	2000	26	1.3
Murchison	1580	48	3.03
Griesinger	118	14	11.01
Flint	73	2	2.7
Curschmann	829	22	2.7
Montreal General Hospital.....	932	34	3.66
Episcopal Hospital.....	1556	34	2.18
Pennsylvania Hospital.....	1793	45	2.5
Total	8881	225	2.54

CAUSES.

The causes of perforation are numerous. As those predisposing to this lesion may be discussed race, sex, age, season, geographical location, stage of the disease, severity of the attack, intestinal parasites, etc. It may in general terms be said that the white *race* is more disposed to perforation than is the negro race, but sufficient statistics on this point have not been collected to enable us to speak with certainty. The male *sex* is more liable to suffer perforation than the female in the ratio of about four to one. Of 279 cases in which the *age* is known, over 12 per cent. occurred in patients under fifteen years of age, over 54 per cent. between fifteen and thirty years, and only 33.6 per cent. over thirty years of age. *Season* and *geographical location* have little influence in predisposing to per-

foration, although, of course, more perforations are apt to occur in the summer and autumn months in this latitude, because there are more cases of typhoid fever at these seasons. It would seem, also, that in warm and semitropical climates this complication is somewhat more unusual than in temperate and cold climates; at least, the majority of reported cases occurred in the United States, Great Britain, France, Germany, and the northern parts of Russia, although cases have occurred in Italy, in Constantinople, and other southern climates. In Mexico it is said to be very unusual.

Intestinal parasites may act as a predisposing cause, and even rarely as an exciting cause. Most of the earlier cases of perforation of the stomach reported were due to intestinal worms, and it seems not improbable that many cases of intestinal perforation reported during the last part of the eighteenth and early part of the nineteenth century as caused by worms were, in reality, in patients suffering from typhoid fever, the physician's attention at the autopsy being drawn away from the mucous surface of the intestines by both the parasites and the extensive peritonitis. Out of 932 cases of typhoid perforation reported as above stated by Armstrong, two had intestinal worms. We have not ourselves observed this complication.

Stage of Disease.—Out of 286 cases in which is known the stage of disease at which perforation occurred, only six, or about 2 per cent., took place in the first week. The second and third weeks witnessed 162 perforations, or 56.6 per cent. of the whole number; while after the end of the third week only 41.2 per cent. occurred.

Severity of Disease.—It has been stated that perforation is more apt to occur in the mild than in the aggravated form of the disease. Dr. George B. Wood² expressed himself of this opinion; Curschmann says perforation is more frequent in ambulatory and mild cases, also among the lower classes, for the same reason, namely, lack of proper care;³ and Osler says, "There is certainly no relation between this accident

and the severity of the disease." ⁴ But, on the other hand, Hutchinson ⁵ claims that in a large proportion of cases it occurs in grave cases, and Osler himself, in a later utterance, ⁶ reverses his opinion by stating that perforation usually occurs in the more severe cases. This is a point which it is difficult to determine; because many ambulatory cases would never be seen in hospitals at all, unless perforation had occurred; and because, when perforation does occur in very severe cases, it is often extremely difficult to diagnose on account of the apathy or hebetude of the patient; and it thus not infrequently happens that a perforation is unexpectedly found at autopsy, when it had been thought that the patient had died merely from the toxæmia incident to a prolonged course of the disease. Moreover, we recollect in after years chiefly those cases where the perforation comes contrary to all expectations; while those patients in whom its advent is hourly anticipated do not create so lasting an impression on our minds. We are, therefore, of the opinion that, although perforation certainly does occur most unexpectedly in some patients, and although in patients who have already reached the stage of convalescence, and in those suffering from an ambulatory form of the disease, its occurrence has frequently been observed, yet that in the majority of instances it is a lesion of the severer forms of the disease, and that it is in these cases that preventive measures, such as they are, should be employed. In connection with the severity of the disease, the existence of *tympany* as a predisposing cause of perforation may be considered. Where ulceration of the bowels is extensive and tympany coexists, there is every reason to believe that perforation is more apt to be produced by mechanical causes, such as a sudden turn in the bed, etc., than in cases where the intestines are comparatively flaccid. The condition of the intestinal walls themselves is, of course, of importance as a predisposing cause: attention has recently been called to the action of the thrombi so frequently observed beneath the serous coat of the bowels in typhoid fever, and it has been asserted ⁷ that they act as a factor favoring the occur-

rence of peritonitis without perforation, and, it seems reasonable to infer, also in predisposing to perforation.

EXCITING CAUSES.—The exciting causes are chiefly those which act mechanically. Anything, in fact, which sets up unusual peristaltic action is liable to cause a solution of continuity in the already damaged intestines; among these, indiscretions in diet probably hold first place; then purges injudiciously administered, a large or too forceful an enema, a sudden motion in the bed, straining on the bed-pan, the almost involuntary contraction of the abdominal muscles produced by the physical shock of the cold bath, each one of these and others have been held responsible for the immediate onset of symptoms of perforation.

PATHOLOGY.

The lesions of the intestine in typhoid fever consist, as is well known, mainly of changes in the lymphoid tissue found in greatest abundance in the lower part of the ileum. In the first week or ten days of the disease the intestinal lymph nodes are swollen, Peyer's patches being, as a rule, affected earlier than the solitary glands. This swelling consists, as has recently been shown by Mallory,⁸ of Boston, chiefly in a proliferation of the endothelial cells of the lymph and blood-vessels; these endothelial cells show a marked tendency to gorge themselves with lymph cells (lymphocytes), thus constituting the pathognomonic "typhoid cells." It is to be observed that a large number of polymorphonuclear leucocytes does not collect until either a mixed infection has arisen or until the typhoid germs have taken on pyogenic properties, so that in the early stages of the disease there is not usually an appreciable amount of "round-celled infiltration." If this medullary infiltration, as it is called, above described, does not resolve, the affected area is thrown off into the lumen of the bowel by a process of coagulation necrosis. This process is aided partly by the mechanical ischaemia produced by the choking of the vascular channels, and partly by the direct action of the typhoid toxins.

These toxins, spoken of rather vaguely in the past, have taken on a new significance from recent studies⁹ which apparently show that they are the agents producing the agglutination thrombosis of the erythrocytes in typhoid fever. This thrombosis, as well as the ordinary form of thrombosis (produced when the engorged endothelial cells degenerate and induce a precipitation of fibrin,—a coagulation necrosis), predisposes to the sloughing, which is either molecular or massive. The surface left by the slough forms the ordinary typhoid ulcer, the floor of which, in the large majority of cases, is formed by the *muscularis mucosæ*.

Now, if this medullary infiltration has involved the whole thickness of the intestinal wall, when the slough is cast, naturally, a perforation of the bowel results. Accordingly, we find that perforations occurring at this stage of the disease are rarely of the pin-point size so frequently observed at a later date. The reports we have examined are not, most of them, circumstantial enough to enable us to derive any authoritative statistics with regard to the relation of the size of the lesion to the stage of the disease at which perforation occurred; but there can be little doubt that, as a rule, the large perforations occur early in the course of the fever.

If, on the other hand, the slough cast off is slight in depth, the resulting ulcer usually heals. The sloughs are usually separated about the end of the second or the beginning of the third week.

When the ulcer fails to heal and gradually deepens, as it approaches the peritoneal coat a slight degree of plastic peritonitis may be set up; the serous coat becomes congested, slight effusion ensues, a patch of lymph is formed on the serous surface, and, in favorable cases, the bowel becomes attached to a neighboring coil or to some part of the parietal peritoneum. This is Nature's method of healing a perforation. A specimen illustrating this process is in the Museum of the Pennsylvania Hospital. A tag of omentum has, in some cases, been found at operation attached feebly to the perforated area.

If the process be not arrested at this point, an abscess will form; and cases have been reported in which such an abscess was not opened for two or three months subsequently, the patients ultimately recovering.¹⁰ If, however, no adhesions form, then perforation into the free peritoneal cavity takes place, and general peritonitis results. Even in cases of perforation arising after this manner, the size of the bowel opening may be great, or several small perforations may form in the floor of the same ulcer. At times it almost seems as if the stage of medullary infiltration persisted throughout the disease, since in cases of perforation from ulceration the surrounding parts of the perforated Peyer's patch sometimes are so thickened and friable that it becomes impossible to make sutures hold; whereas at other times the bowel has become so thinned by extensive ulcers that it appears like paper. At times, too, it is impossible to tell whether the perforation has arisen from sloughing or from progressive ulceration.

Much has been written about a preperforative stage; and there can be no question but that there is always a time previous to perforation, but we very much doubt whether it can be recognized as a pathological any more than as a clinical entity; because so often there may be a certain degree (and at times a very marked one, too) of peritonitis without any macroscopic evidence of perforation.

As to the form of the perforation, the larger circular lesions are, as has been stated above, generally due to sloughing; the smaller, or cribriform, to ulceration; and the oblong, slit-like perforations have been thought to be due to traumatism.

The perforation is usually situated on the part of the bowel diametrically opposite to the mesenteric attachment, where the lymph glands of the intestine are found and where the blood supply is poorest. Occasionally, however, an ulcer will perforate between the layers of the mesentery, and a retroperitoneal abscess will be formed. Such a lesion may be mistaken for a suppurating mesenteric gland.

The perforation is fortunately single, as a rule; in 271

cases in which this point is mentioned, a single perforation occurred in 236, while in the remaining thirty-five it was multiple. In seventy-two cases the perforation was less than one-eighth of an inch in diameter,—practically pin-head in size; in seventy-three cases it was under one-half an inch; and in only twenty-three cases was it over a half-inch in diameter,—there being only 168 cases in which the size of the perforation was mentioned.

The site is mentioned in 190 cases, and in 140, or over 73 per cent., of these the lesion was found within twelve inches of the cæcum; and in only four cases, or 2.1 per cent., was it more than three feet distant from the ileocæcal valve. In seven cases only was the colon perforated, five times the ascending colon, once each the transverse colon and the sigmoid flexure. Meckel's diverticulum was perforated three times, and the appendix eight times. It is to be noted that we have carefully excluded from this series every case of perforated appendix in which the lesion has not undoubtedly been proved to be of typhoid origin, even rejecting, as of doubtful value, some such cases previously accepted by other authors. There were twelve patients in whom a subsequent perforation occurred. These all died. In three cases, while one or more perforations were found at operation, yet others in the same patients were not detected,—these all likewise perished.

At times the perforation is only to be seen after a patch of lymph has been removed from the bowel, the perforation then appearing as a dark spot in the centre of an intensely congested area, at times nearly sphacelated and falling away beneath the fingers.

There was not a sufficient number of cases reported in detail to enable us to determine in what proportion or after what lapse of time adhesions would be found; but, generally speaking, it may be said that adhesions are the exception, that they are usually indicative of a mixed infection, and that, except in cases of several days' standing, they are of unfavorable prognostic import. With regard to the bacteriology, it has been found that in cases where the typhoid bacillus alone

is the infecting cause, the usual lesions are a low-grade peritonitis, frequently lemon-colored exudation, few adhesions; and not much lymph. Where the streptococci or the staphylococci abound the lymph is more abundant, and adhesions are the rule if the peritonitis has lasted more than a few hours. The prognosis is much more grave in the streptococcic infection than in the typhoid. An interesting case in this connection was observed at the Johns Hopkins Hospital. At the first operation on a patient suffering from typhoid perforation bacteriological examination of the peritoneum showed no organisms, while the intestinal contents contained streptococci in abundance; this patient was later subjected to a second laparotomy, at which time the peritoneum was found to be infected by the streptococci, and death soon followed from the peritonitis.¹¹ Evidently in this case the time which elapsed between the initial symptoms of perforation and the operation—five and a half hours—was not sufficient to infect the peritoneum extensively with intestinal contents; whereas forty-three hours later, when the second operation was performed, general purulent peritonitis was well advanced.

SYMPTOMS.

In what may be called a typical case, the symptoms are well marked and easily distinguished; but, unfortunately, such a case is the exception. It is well known, moreover, both that a patient who has presented all the clinical evidences of a perforation may submit to laparotomy, and no perforation nor even a trace of peritonitis be found; and that, on the other hand, patients may die without any abdominal symptoms of importance, and at autopsy a perforation may be found, to every one's complete surprise.

But there are undoubtedly certain symptoms which should at once throw the attending physician on his guard, and which should make him disposed to consult one with surgical acumen, even before he is sure a perforation exists. A patient in the second or third week of the disease, who at various times has had slight or more severe stabbing pains in the abdomen;

whose abdomen is much distended and tympanitic; who, perhaps, is somewhat apathetic; who is apt to have retention of urine, and has perhaps lost control of his faecal evacuations,—such a patient should be watched hourly. Any one of these slight stabbing pains may be significant of perforation, and, although pain alone is by no means pathognomonic, it is by all means the most valuable subjective symptom.

Pain.—The pain is, as described, usually a stabbing sensation, most frequently in the right lower quadrant of the abdomen; though for it to be felt in the epigastric or the umbilical regions is also customary, and a not unusual situation is in the bladder or, in the male, at the end of the penis.¹² Cases have occurred in which, on such complaint from a ward patient, the orderly has been allowed to use the catheter, drawing perhaps a couple of ounces of urine; and the patient, not again complaining, has been neglected, until in a few hours a fatal peritonitis has developed. But the pain may not cease so readily, and the patients at times will scream out and roll around the bed in an agony, doubling themselves up with abdominal pain, which may persist for two or three hours with undiminished intensity. Again, as has been mentioned, in a very apathetic patient no pain at all may be felt, or, at least, none be complained of. Or, on the contrary, there may be only a gradually increasing discomfort in the abdomen, with no sudden sharp onset of pain. This is more usual where the abdomen is already tympanitic and where peristalsis has been for some time very slight.

Vomiting occurs so frequently in severe cases of typhoid fever with no apparent exciting cause that it cannot alone be considered at all indicative of perforation; but where it occurs for the first time, and especially where it either precedes or follows pain, it should not be passed lightly by. If it is at all violent it will very likely cause a perforation, and in very many instances follows it.

Temperature, etc.—At the same time as the pain, or soon after, sweating may occur; it has even been known to precede the pain, which has always been supposed to be indicative of

the moment of perforation. With the sweat, or when sweating is absent, occurs a fall of temperature: a drop of four to six degrees is not infrequent. It has been claimed that this fall of temperature—this *hypothermic*—is not at all constant; and the dictum of Dieulafoy, “No perforation without fall of temperature,” has been called in question by some authors, notably by his countryman, Lereboullet, who maintains, on the contrary, that a rise of temperature invariably follows perforation. Hagopoff tries to reconcile these statements by claiming, and, we think, not without reason on his side, that where no “hypothermic” has been observed it is simply because the temperature was not taken sufficiently soon after the perforation occurred, but at a time later, when the temperature of the patient had risen as a result of the subsequent peritonitis; this explanation really upholding the views of Dieulafoy. Lereboullet’s contention certainly cannot be true in all cases, since sometimes the patient is so collapsed as a result of the perforation that the ensuing peritonitis, even if he live long enough for it to commence, is not sufficient to raise his temperature to the normal, but he dies in collapse.

Very confusing in this connection are those cases in which several falls of temperature have occurred within a day or so of the suspected perforation. Fall of temperature is, of course, a frequent accompaniment of intestinal hæmorrhage during typhoid fever; and, either as a result of that, or even with no ascertainable cause, the patient may for several days, perhaps merely from general loss of vascular tone, have suffered at irregular intervals from sweats and sudden falls of temperature. So that neither of these symptoms, any more than abdominal pain, is to be regarded as pathognomonic of perforation.

Frequently a change in the solubility of the *bowels* follows perforation. Were they loose before, they become confined; or were they costive previously, this condition is replaced by diarrhœa.

Delirium may have pre-existed, or may develop only with the peritonitis.

Leaving now the subjective symptoms, we come to the physical signs, on which more reliance is to be placed; and of these by all means the most valuable is rigidity of the abdominal walls.

Rigidity.—By this we mean, not that rigidity which the physician may any day produce by thrusting his fingers into the patient's belly so as to feel the backbone, but the well-known rigidity ensuing on peritoneal inflammation, and which is involuntary, reflex, not produced by palpation. This muscular rigidity is most frequently observed in the right rectus muscle; also in the right oblique muscles and in the left rectus; in time spreading with the peritoneal inflammation all over the abdomen. A surgeon's rigidity and a physician's rigidity are two vastly different things, and the distinction is well worth remembering. The rigidity of pleural irritation is sometimes mistaken for peritoneal involvement, or *vice versa*. In one of our own cases operation was delayed because of evidences of a pulmonary lesion, whereas perforation was really present, as was sadly manifested by the peritonitis which developed a few hours later, and the operation performed then was too late.

Pulse and Respiration.—Along with these cardinal symptoms—pain and rigidity—there is, in the vast majority of cases, an increase in the pulse-rate. In most cases of typhoid fever the pulse is slow in relation to the height of the fever, rarely averaging more than 100 beats per minute; but after perforation the rate rises to 120 or 140 in a very short time, often within fifteen or twenty minutes; and the respirations may be accelerated as well. Not until peritonitis is well advanced does purely costal breathing replace the costo-abdominal, which is the normal; and patients who are at all conscious alter the character of their respirations so readily during examination that too much reliance should not be placed on this sign.

The facial expression is important. Almost from the very moment of perforation there is a distinct change of expression, difficult to describe, yet easily recognized when once seen. It is not the peritonitic facies, which closely approaches the Hip-

pocratic in type, but is distinctly characteristic of the shock of perforation. It is what the French might call an "abattement" of the countenance, consisting in a general weakening of the expression.

Tenderness, while often present throughout the disease, is probably, without exception, increased by a perforation. In appendicitis it may persist when, the appendix having become gangrenous, rigidity has disappeared; but we are of the opinion that in intestinal perforation rigidity is the more valuable sign of the two; for, as has been mentioned above, in the apathetic state to which typhoid patients often attain, tenderness sometimes cannot be elicited. When present, it is usually found in the right lower quadrant, near the customary site of the lesion.

Dulness to percussion is a very uncertain sign. It may exist from a faecal accumulation, and be mistaken for the matting together of intestines from peritoneal inflammation. Even movable dulness in the flanks may be caused by fluid faeces within the intestinal tract, when there is no suspicion of perforation. But if well-marked movable dulness in the flanks develops in the course of an hour, as we have seen it do, it presents very excellent evidence of a solution of continuity in the intestinal walls, as it is scarcely conceivable either that fluid faeces within the bowels should at one time produce no such signs, yet within an hour later do so; or that an amount of exudation sufficient to give movable dulness could be formed by the peritoneum in so short a space of time. But, on the other hand, the absence of this free peritoneal fluid should, on no account, be taken as showing that neither perforation nor peritonitis existed.

The same remarks apply to obliteration of the liver-dulness as to movable dulness in the flanks; it may occur merely from tympany, without perforation, and even with perforation and with air free in the peritoneal cavity, the dulness over the liver may persist. However, they are both interesting signs, and it is well to note their presence or absence.

Edema of the abdominal walls is occasionally observed

in this as in other intra-abdominal lesions, but has no specific significance.

BLOOD.—The condition of the blood is one of the most vexed questions that arises in this connection. It has been much more extensively studied by American than by English or Continental observers. Osler says that a steadily rising leucocyte count is indicative of perforation; for such an observation the white blood-cells should be counted every half-hour or hour during the period of uncertainty. Few hospitals, and no one in private practice, can afford to have this done, even the routine work in most institutions consuming the whole time of the clinical pathologist. In most cases where, in the course of twelve or eighteen hours, three or four examinations at the outside are made, the majority of advocates of the benefits conferred by blood examination claim that such erratic observations are of no use. The average surgeon is averse to having his diagnosis made for him in the laboratory, and will not hesitate to follow his own judgment, in the face of overwhelming contraindications from the microscopist's standpoint.

A wave of leucocytosis has been described, reaching its maximum soon after perforation, and then again subsiding. Differential counts have been claimed to be more reliable than a mere enumeration of the white cells as a whole, inasmuch as in commencing peritonitis there is a disproportionate increase in the polynuclear neutrophiles.

In drawing conclusions from any leucocyte count in typhoid fever, the normal leucopenia of this disease should be borne in mind.

This whole question is as yet undecided, the accurate observations being still too few to draw any very definite conclusions.

DIFFERENTIAL DIAGNOSIS.

A differential diagnosis has most often to be made from hæmorrhage. While the collapse is very likely the same in either case, yet hæmorrhage is, as a rule, not attended by pain, and there is no rigidity present; in hæmorrhage the blood is

generally passed by the bowel in the course of an hour or so at the outside; and in most cases where confusion is liable to arise, the occurrence of previous hæmorrhages in the same patient would incline one to pause before undertaking an exploratory laparotomy. Osler and others have reported series of cases in which attention is called to the frequent association of hæmorrhage with perforation; and in any case where reaction from the collapse, due to an obscure abdominal lesion, does not occur promptly, we are in favor of operative treatment, since in one of our own cases the bleeding point has been found by laparotomy and ligated.

The diagnosis from peritonitis without perforation is immaterial, as operation is indicated in both conditions.

From appendicitis the diagnosis can best be made by recollecting that in appendicitis there is rarely such collapse as occurs from perforation of the small or large intestine, even if the appendix be perforated. Vomiting is more apt to have occurred with the initial pain in appendicitis than in perforation. Moreover, vomiting may cause perforation, while it could scarcely alone produce appendicitis. Symptoms resembling those of appendicitis are not unusual at the beginning of an attack of typhoid fever, and in a number of cases the appendix has been removed under such circumstances with happy results. The differential diagnosis here, too, is not especially important, as the removal of the appendix for disease is indicated in typhoid fever as well as at any other time.

From peritonitis due to pelvic or ovarian disease the diagnosis can usually be satisfactorily made by attention to the history of the case, together with a vaginal examination.

We have seen intussusception occurring during an attack of ambulatory typhoid fever, but, as the peritonitis was already well advanced, no question of differential diagnosis arose.

Affections of the gall-bladder occurring during typhoid fever from infection by the typhoid bacillus are not uncommon; they present pain in the right hypochondriac region; sometimes jaundice; vomiting is more persistent; no fall of temperature occurs; there is little shock; and the physical

signs—tenderness, rigidity, dulness, palpable mass—aid in the localization of the disease.

Gastric ulcers may perforate during typhoid fever: the localizing signs here, too, are our chief guide.

Finally, suppurating mesenteric glands, or splenic infarcts, may give rise to peritonitis in this disease; but here the symptoms are those of peritonitis pure and simple; there are none of those characteristic of intestinal perforation.

PROGNOSIS.

It may be confidently said that of those patients who die after an operation, in very few, indeed, has the operation hastened death. Even in those cases which end unfavorably, it is usually observed that the patients have left the operating-table in better shape than that in which they were brought to it: so much is gained by intravenous saline injections, by vigorous hypodermatic stimulation, and frequently by the free douching of the abdominal cavity with hot saline solutions.

Only five of the patients operated on are known to have died before the conclusion of the operation. Of those that died, twenty-one lived two days, twenty-three lived three days, twenty-one lived five days, seven lived nearly a week, while eleven lived over a week, three over two weeks, and four over a month; certainly in these last eighteen cases the patients may be said to have recovered from the operation.

Of the whole number, 26 per cent. finally left the surgeon's hands well. A small proportion of these, to be sure, might look forward to an intestinal obstruction arising at any time of indiscretion in diet, if they had been the subjects of extensive peritoneal adhesions; some, furthermore, when last reported had still a faecal fistula in the wound; and probably a considerably larger number had or would soon develop a ventral hernia; but taking them all in all, they had reason to be thankful to have escaped a typhoid perforation with their lives.

The extensive analytical tables attached show in compact form the mortality rate considered from very various points

of view. Briefly stated here, the most favorable cases have been those in girls from ten to fifteen years of age, the perforation occurring in the first week of the disease, when the constitution is still strong, or in convalescence, when the frame is already re-established; who have been operated on in the third hour after perforation, the single perforation being pin-head in size (under one-eighth of an inch in diameter), within a few inches of the cæcum, or in the appendix; and where neither fæcal extravasation had occurred nor adhesions were present. Such would be ideal cases, and the mortality should be less than 50 per cent.

TREATMENT.

The treatment of all patients suffering from intestinal perforation in typhoid fever should be by laparotomy and suture of the perforation; to trust to medical treatment alone is nothing short of folly. Some cases may be thought an exception to this rule: those patients who are manifestly moribund should be given the benefit of doubt, and if, under vigorous stimulation, any improvement is noted, or even if they cease to grow worse, the surgeon should not hesitate to interfere. The average time consumed in the operation by skilful operators is about fifteen or twenty minutes. Nor should it be forgotten that ether is a heart stimulant, and if the pulse improves under its administration operation is surely justified. We believe that well-authenticated cases of recovery from intestinal perforation without operation are excessively rare; indeed, since it has happened with every symptom of perforation present, and the abdominal cavity having been opened and explored, that no signs of perforation, much less of peritonitis, have been found, it may be considered proved that the examples of so-called recovery from perforation without operation are cases of this nature, and that while the symptoms of perforation and of peritonitis may have been present, yet such lesions did not exist. Even in cases, almost unknown as they are, where the patients have survived the immediate effects of the perforative peritonitis, yet, even many months subse-

quently, they have submitted to laparotomy for an abdominal abscess of apparently obscure origin, but evidently arising from the former peritonitis—the condition being, in fact, one of residual abscess. Hagopoff, seemingly a careful observer, accepted as genuine instances of recovery without operation only fourteen cases, rejecting those observed by Griesinger, which are recorded in the thesis of Morin. When it is recollected that, according to the calculations of Briggs,¹³ more than 16,000 perforations of the intestine due to typhoid fever occur annually in the United States alone, the exceeding rarity of recovery without operation is appreciated by realization of the fact that for all time, and all over the world, only fourteen cases are known which have so terminated.

From the moment of diagnosis until the time of the operation little is to be done in the way of treatment except by stimulation, hypodermatically, or with intravenous saline injections. To avoid the delay sometimes occasioned to obtain consent of the family to an operation, it is well to arrange such questions, in every possible case threatening perforation, even before the diagnosis is made: the less time that elapses between diagnosis and operation the better for the patient.

Anæsthetic.—As to the danger of a general anæsthetic in such patients as these, we believe that while some operators may have the faculty of so hypnotizing their patients as to make local anæsthesia available, yet the average surgeon will succeed better by the use of ether judiciously administered. In other climates, and in higher altitudes, we have no doubt that with care chloroform can be safely employed, but certainly in the middle and northern parts of the United States nothing is so satisfactory as ether. We are, moreover, of the opinion that a general anæsthetic will, in the average patient, tend to diminish shock; although we freely admit that the abolition of all afferent impulses produced by the cocainization of sensory nerves will theoretically render impossible the physical conditions now believed to be necessary for the production of surgical shock. But mental perturbation is at least an equally disquieting element for the surgeon to deal with, and

this is in no respect diminished, but rather augmented by the consciousness on the patient's part of the details of the surgical procedures.

Most of the patients with perforation seen by us have been already in such a state of prostration that only a few whiffs of the anæsthetic have been required to completely anæsthetize them, as well as to render them unconscious and to relax their abdominal muscles, a state which is not attained by the use of a purely local anæsthetic.

In the majority of cases where the operation has been commenced with a local anæsthetic, it has been found expedient to resort to the use of ether or chloroform soon after opening the peritoneal cavity, and often fifteen or twenty minutes have been consumed in making the incision through the abdominal parietes alone, the patient meanwhile complaining bitterly. This state of affairs, we should add, has not always been the case, for some surgeons have had most gratifying results from local anæsthesia in operations of this kind.

When anæsthetization is begun (and this should not commonly be done until the patient is on the operating-table), the abdomen should be shaved, including the pubic hair, and cleansed. We prefer for this purpose turpentine, followed by green soap and water and then by alcohol; the whole area is then thoroughly rinsed off with corrosive sublimate (1 to 2000) and covered with a cloth wrung out of this solution until the surgeon, who has meantime been cleansing his hands, is ready to operate. The three processes—anæsthetization, cleansing of the abdomen, and washing of the surgeon's hands are commonly completed at about the same time, so that everything is coincidently ready for operation. It is convenient for the surgeon to have two assistants as well as three nurses at his service: one nurse to hand instruments, thread needles, etc.; a second to attend to the gauze sponges; and a third to bring hot salt solution, etc., as wanted. There should, likewise, be a fourth nurse at the call of the anæsthetizer to administer hypodermatic injections, tend the oxygen apparatus, and similar duties. Where facilities abound, a third assistant for

the surgeon and a fifth nurse can frequently be advantageously employed in giving an intravenous injection of hot normal salt solution; seldom more than three pints are necessary, often two is an abundant quantity. By recommending all this array of assistants as convenient, we do not by any means wish to be thought to discountenance impromptu surgery where necessary in these cases. There have been brilliant successes reported from operations done by lamplight on a kitchen table, in huts miles away from city hospitals; and such records are among the proudest in surgery; but wherever possible it is the operator's duty to organize success.

The cleansing of the abdomen, while thorough, should not be vigorous, both for fear of diffusing any extravasated faecal matter and of producing further perforations.

From the time the knife is first taken in hand things should move with rapidity; this is only possible by system and regularity. We know of no other condition, except it be, perhaps, hæmorrhage, in which speed in operation is so imperative. In too many instances it is a race with death, and there are often anxious moments when it is questionable who will win; yet in only five of the reported cases is death known to have occurred before the operation was completed. A "death on the table" is, under all circumstances, a most painful occurrence in surgery, but it is doubly so if the surgeon has in any way to blame himself for delays that might have been obviated by a prudent mind.

The incision is best made to the right of the median line, over the cæcal region. Many of the earlier operators employed a median incision, in most instances hypogastric, but in not a few epigastric; their results, however, and especially so with the epigastric incision, do not invite imitation. In ninety-six cases where a median hypogastric incision was employed the mortality was over 78 per cent., while in 141 cases where the right lateral incision was used the mortality was less than 70 per cent. Of course, were an abscess to be manifestly pointing in a certain region it would be absurd to open the abdomen elsewhere. Where the median incision has been

employed, it has only too often happened that the surgeon has searched the presenting small intestine diligently without finding a perforation, until he has unexpectedly lighted on the duodenum, and has then been forced to retrace his steps downward to the cæcum, thus losing valuable time, and shocking his patient by prolonged manipulation of the bowels.

The length of the incision need not in abdomens of average thickness exceed four inches, as a rule; in uncomplicated cases three inches can be made to suffice; while in those patients with immensely fat abdominal walls the incision may, unfortunately, have to be extended nearly to the edge of the ribs upward and to the symphysis below. It is, on the other hand, by no means wise to endeavor too much through too small an opening; much harm may occur from blindly tugging at a coil of intestine which fails to come out through a wound, not because the latter is too small for such delivery to be physically possible, but because the bowel is retained by adhesions, the incautious rupture of which may cause much mischief.

The incision we prefer is that through the outer half of the right rectus muscle: it is straight, simple, direct, and economical of time; the deep epigastric artery is not apt to be wounded with ordinary care, using the handle rather than the blade of the scalpel to separate the muscular fibres; it is a route that gives direct access to our landmark, the cæcum, and to that part of the small gut most often affected; it affords quite sufficient room for exploring nearly the whole abdomen; it can be extended in either direction at need, and offers excellent drainage facilities. In those very rare cases where the perforation is in the sigmoid or in those parts of the small intestine not in reach of this wound, this incision should be temporarily closed, and another made where, from intra-abdominal exploration, it is evident that it would be nearest the seat of the trouble.

When the peritoneal cavity is opened the cæcum should be located; it is usually immediately beneath the wound or a little to the outer side. The vermiform appendix should be inspected and removed, if necessary. If extravasation is free

no packs are required. If, however, it appears that the peritonitis is fairly well localized the affected area should be walled off with large gauze pads. The ileum is next drawn into the wound and carefully examined; it is a great advantage to have two pairs of eyes examining it at the same time as it passes through the surgeon's hands, one watching the upper and one the lower surface. It is usually inadvisable to replace the gut at once on withdrawal, as this consumes valuable time, which is better spent searching for the perforation until found. If, however, more than two or three feet of the ileum have been examined fruitlessly, and there still appears to be reason to consider a perforation present, the eventrated parts should be re-examined, commencing at the highest point withdrawn, and ending at the cæcum, the coils being replaced as the return is made, but the highest coil being kept out of the belly until all the others have been replaced, as a starting-point for further search, which should proceed upward along the ileum with like manœuvres until there appears no further prospect of finding a perforation. This probability decreases as the area of greatest inflammation is left behind. The appearance the perforation will present can often be fairly accurately foretold by attention to the known pathology of the disease: if faecal extravasation is free a medium or large-sized hole may be expected; if lymph abounds and clings to the bowel in patches, frequently beneath one of these patches will be found the pin-head lesion as a dark spot in the middle of an intensely congested Peyerian gland.

Throughout these manipulations the utmost care should, of course, be exercised to prevent chilling of the eventrated bowels. This is best secured by covering them with a hot towel, and constantly douching it and the bowels with hot saline solution; this aids, too, in washing away pus, etc. It should be seen, also, that the patient is not thus made to lie in a pool of rapidly cooling water; he should be so protected by blankets, mackintosh cloths, etc., as to maintain his bodily warmth, and, if necessary, he may even be surrounded by hot-water cans during the entire operation. If adhesions are

present, the operation is much more tedious and difficult; but fortunately they are rare.

Suture.—When the perforation is found all other coils of intestine should be replaced, and it should be sutured. But if the bowel is much distended with gas or faecal matter, it is well to allow it to discharge itself through the perforation outside the abdomen. Indeed, puncture of the bowels for this purpose has been employed to facilitate eventration, but we have never found it necessary to do this, although, to aid their reposition, it is sometimes nearly imperative. Any such puncture is easily closed with a couple of Lembert sutures.

Excision of the ulcer we deem not only perfectly useless, but harmful as well, since it consumes unnecessary time and might open a blood-vessel.

Black silk we think the best material for the intestinal suture, using it threaded on a round straight needle. Such a needle is more easily controlled by the fingers, and, when time is such an important element, such devices as needle-holders may well be dispensed with. Usually we prefer to apply first a row of mattress sutures parallel to the long axis of the gut, crossing the longitudinal Peyer's patch at right angles. A second row of Lembert sutures, likewise applied longitudinally, but continuous, is also employed; and in the vast majority of cases these two tiers are quite sufficient to occlude the perforation satisfactorily. At times it may be more expedient to use a purse-string suture, the application of which takes less time, and which holds well if the perforation is small and the surrounding bowel in fairly good condition. We seldom rely on Lembert sutures alone, even in several superimposed rows. We avoid, where possible, a line of suture transverse to the long axis of the gut, believing that the tension on the stitches is thus greater and that the lumen of the bowel is usually more impaired. It is unusual to find the diseased area extending as far transversely as it does longitudinally, but where this is the case in such a degree as to make suture impossible, or from other cause, the grafting of a piece of omentum over the defect, enterectomy, with end-to-end anastomosis, or simply the estab-

lishment of a false anus, must be considered. The choice depends largely upon the general condition of the patient, the skill of the surgeon, the location of the perforation, and the state of the peritoneal cavity. To make a false anus consumes less time and is easier of operation to one unaccustomed to abdominal surgery. It may even be done without suture by the judicious use of gauze packs, leaving the perforation isolated and beneath the abdominal wound. Of four cases treated by the establishment of a faecal fistula, every one died. This tremendous mortality, however, does not prove that the operation is necessarily fatal in cases of typhoid perforation, but merely that it has been employed only in exceedingly ill patients. On the other hand, of those sixteen patients who withstood the immediate shock of the operation, and in whom a faecal fistula developed in the wound after operation, only two died,—the surprisingly low mortality of 12.5 per cent. This shows that direct drainage of the intestinal tract is actually beneficial. In this connection it is interesting to recall the treatment by the establishment of a false anus advised by some authorities in cases of colitis, and even in typhoid fever, as a means of drainage and irrigation of the large bowel.

But the establishment of a faecal fistula is sure to prolong the healing of the wound, and, in a fair proportion of cases, will require a subsequent operation for its closure. In those exceptional cases where the lesions are high in the intestinal tract, it is, of course, not to be considered, on account of the well-recognized danger of starving the patient by short-circuiting his ingested food. Moreover, it is difficult to drain the peritoneal cavity effectually through the same wound at which the bowels are emptying themselves, and there is the constant risk of reinfecting the peritoneum by leakage backward. So that, on the whole, where inversion of the perforation by suture or omental grafting is impossible, excision of the diseased portion of the gut, with circular enterorrhaphy, is by all means to be preferred. But this should not be lightly undertaken; for while cases have been recorded where the narrowed lumen of the bowel, due to inversion of the perfora-

tion, has been held responsible for death from intestinal obstruction, yet we believe that this complication is not to be apprehended, except where practically no lumen at all exists: the fæces in the ileum are usually fluid, and there is no reason to expect that a stricture thus formed may not dilate sufficiently in the natural course of events to cause no further trouble.

Circular enterorrhaphy may be performed satisfactorily here without mechanical appliance; those who prefer such devices may employ the O'Hara or the Laplace forceps, and the Murphy button may be used without fear of evil consequences. It has been thought that this last would be liable to cause a new perforation while passing out, or would pull loose from the friable intestinal walls by its own weight; but we do not think these accidents more liable to occur in typhoid fever than in other cases. Intestinal resection was employed five times in our series of cases, with only one recovery. The Russian surgeons have been its chief advocates, but it is apparently too severe an operation to be usually recommended.

Omental grafting is applicable as well to ulcers threatening perforation as to actual perforations. The omentum is to be adjusted over the defect and retained in position by points of the interrupted suture. In some cases the omentum has been found already covering in the perforation and preventing fæcal extravasation. Grafting the omentum in place is in every way preferable to either establishing a false anus or to enterectomy.

In selecting the special method of operation time should not be unnecessarily wasted; every surgeon knows that it is better to do the second-best thing for his patient than to let him die while a decision is being reached.

Every perforation having been found and treated as seems indicated, the *toilet of the abdominal cavity* should next claim the surgeon's attention. While he retains the sutured gut beneath the wound, he should, in our judgment, if there has been fæcal extravasation or if there is general peritonitis, resort to free douching of the abdominal cavity. And in doing this he should remember that the perforation is now practically out

of the question, and that his only hope in saving the patient lies in combating the peritonitis. To this end a large tube, one-half inch in diameter, with multiple perforations, should be introduced through the wound, a rubber tube and a funnel being attached to its outer end, and through this should be poured gallons of hot solution. We are of the opinion that the quantity has more to do with success than the quality of the fluid used, although our own practice is to use normal salt solution in ordinary cases; and in cases with much pus, streptococcic in origin, we use first the normal salt, then equal parts of normal salt and hydrogen peroxide, and, finally, normal salt again—several quarts of each solution being employed. The temperature of these solutions should be at least 110° F., and to insure its reaching the abdomen not below this temperature, it is well for the thermometer in the receptacle from which the supply is drawn to stand at not less than 115° F. The tube through which this douching is carried out should first be applied to the pelvis, in the rectovesical space, and in females both in front of and behind the broad ligaments; it should then be carried to the left flank and loin, up even to the spleen; the right side should be similarly treated, and the spaces between the intestinal coils should finally be visited. The douching should be continued until the return fluid is clear. Some surgeons have advocated first sitting the patient up to allow all matter to drain into the pelvis, and when that had been accomplished, reversing the body into the Trendelenburg position, and then mopping out the pelvic cavity with gauze. A patient treated by these heroic manipulations recovered.

When the surgeon is satisfied that the abdominal cavity is as clean as he can make it by this method, but not before, the tube may be withdrawn, but the main part of the fluid that has not already escaped, and which is clean, should be allowed to remain.

Several of the earlier operators used carbolic acid or boric acid solutions for this douching; and, as we said before, we do not think the composition is of any particular moment, the

cleansing being largely mechanical. Some of the later surgeons, notably those at the Johns Hopkins Hospital, have, under local anæsthesia, prolonged this douching for upward of an hour, but we do not think much is gained by such a course. It is, however, unquestionable that very many patients show very marked constitutional improvement from the abdominal douching; the heat combats the shock, and the fluid is constantly absorbed, thus taking the place of or aiding an intravenous saline injection.

Many authorities are unalterably opposed to douching the abdomen at all in these cases, asserting that the infectious particles are only more widely diffused, and relying entirely on dry sponging and rubbing off of lymph patches, etc. While we have no desire to deny that these methods have in some instances been followed by the happiest results, and while we have ourselves treated cases without douching of any kind, yet we remain firm in our belief that by douching in the manner above described lies the surgeon's greatest hope of success. Moreover, we recollect that long ago Sir James Paget contended that "wounds," and, we may add, *a fortiori*, the peritoneum, "should not be scrubbed, even with sponges."

In the appendix will be found an analysis of those cases where the description of the operation was sufficiently minute to enable us to abstract the treatment in regard to irrigation, wiping, drainage, etc. It is to be regretted that most reports are so vague in these particulars as to be not adapted for such purposes. Those cases marked "wiping and drainage," with a mortality of 61 per cent., were mostly cases of purely localized peritoneal lesions, as were also those where neither irrigation nor drainage was employed, with a mortality of only 41 per cent.; so the success here was only relative, and does not show that these methods are the best for all cases.

Drainage.—Drainage is necessary in nearly every case. We now prefer gauze drains to the tube we formerly employed. The amount and the extent of the drains to be inserted will, of course, depend on the extent of the peritonitis. In the simplest cases a wick of gauze alone may be placed to

the site of the sutures in the intestine, and the abdominal wound closed through nearly its entire length. If, however, there be any suspicion of pelvic involvement, a good-sized strip of gauze should be carried down to the pelvic floor. We commonly employ pads of sterile gauze, about six by eighteen inches in size, composed of four thicknesses, stitched together; or loose, crumpled gauze answers equally well, although not so handy. We see no advantage in iodoform or other medicated gauze in these cases, and never employ it. Some instances of poisoning from iodoform gauze indiscriminately used in abdominal surgery are within our cognizance, and the possibility of such an event alone is enough to deter one from its use. In cases of wide-spread peritonitis a second piece of gauze to the left flank, a third to the right, outside the descending and the ascending colon, respectively; a fourth above the ileum and to the inner side of the ascending colon, are advisable, and several more as may be required to hold the small intestines away from the pelvis and the site of operation. We have seldom had to use more than seven such packs. The ends projecting from the abdominal wound should be left fairly long, and those going to the pelvis or to the intestinal sutures should be indicated by a knot or a safety-pin, so as to avoid confusion later.

If the abdominal wound be very large, a suture or two may be applied at each end to somewhat diminish its size and to obviate the protrusion through the unhealed wound of a knuckle of gut, although this last complication has in no way interfered with recovery in the cases where it has occurred.

The dressing should be copious. Crumpled gauze should be applied next the wound in abundance, and over this many layers of flat gauze, the whole being retained in place by a bandage of Scultetus.

The patient is to be speedily returned to a well-warmed bed, not in the general ward, and be allowed to retain the same bed until fairly convalescent. The frequent moving of such patients is extremely undesirable. The foot of the bed may be raised twelve or eighteen inches, and the fluid will thus

readily drain out of the pelvis. Some surgeons prefer Fowler's position, with the head of the bed raised, so as to drain into the pelvis; but while good results have been obtained by both methods, the former commends itself to us as aiding in overcoming the shock, as well as making very efficient drainage.

Hypodermoclysis, or intravenous infusion of normal salt solution, may be begun now or continued if not completed as soon as the operation. When the patient comes out of ether a high enema of hot normal salt solution should be given, and may be repeated every two or three hours. It both allays the thirst and is a valuable adjunct to the abdominal drainage. A pint is readily absorbed by the colon in a short time.

AFTER-TREATMENT.—If the patient reacts from the perforation, he must be nourished, but all food by the mouth is to be avoided as long as possible. Six to eight ounces of milk peptonized for a half-hour, with some prepared beef-juice, may be given by enema every two or three hours, the balance of the pint being of the normal salt solution,—fortunately there is no palate in the lower bowel, and such mixtures are well tolerated. Hypodermatic stimulation is indicated as in other cases of similar nature. Hypodermoclysis of normal salt is likewise a valuable adjuvant, and may be repeated in quantities of a pint or two every four or six hours. Indeed, we think that the more fluid that can be absorbed from the lymphatics in these ways—hypodermatically and from the colon—the better it is for the patient; it overcomes the typhoid toxæmia, which is too often the precursor of death, and drains the peritoneal cavity from the mucous lining of the intestines outward. A few hours after the operation the outer dressings will probably be found saturated with the salt solution left in the abdomen at the time of operation, and will require changing. This saturation of the outer dressings may occur every four to six hours at first, being a favorable sign; the gauze packs acting as siphons and draining the peritoneal cavity in a most satisfactory manner.

Ice to the abdomen we regard as harmless, but of doubtful utility.

We have found in analyzing these cases that the greatest number of deaths took place between eight and twelve hours after the operation. Those patients who lived more than twelve hours after the operation had a fair chance of recovery, only 59.8 per cent. of them dying.

After twenty-four hours a teaspoonful of hot water may be given by the mouth every ten or fifteen minutes. Thus taken it is less apt to nauseate, and is probably all absorbed before reaching the stomach. No food should be given by the mouth until the third or fourth day at least, nutritive enemata being meanwhile continued. One or two cleansing enemata of plain water in the twenty-four hours are usually sufficient to remove all fecal matter. When mouth-feeding is begun it should be borne in mind that the patient has both typhoid fever and a sutured area in his intestine, and he should be fed accordingly. Those cases do best where, the acme of the disease being past, a fairly liberal diet can be allowed early. Those patients, on the other hand, who, although they were in fairly good condition at the time of perforation and so have borne the operation well, but have yet several weeks of fever with which to contend, are very apt to die during the second or third week after the operation.

After the third or fourth day the surgeon should begin to think about removing the gauze drains; but let him be in no hurry about it; far better for them to remain a week or ten days than to be removed too soon. They should be well moistened with salt solution or hydrogen peroxide, and be given time to absorb it, and the utmost gentleness should be used in separating them from the intestines. It should be remembered that in time the peritoneal granulations will push the gauze away as a foreign body, and if the drains cannot be readily withdrawn on the first trial the attempt should be postponed for twelve or twenty-four hours. In drawing on the gauze it is well rather to try to separate the bowel from the gauze than the gauze from the gut. This is most expeditiously done by a sort of blunt dissection with the finger. Blind tugging at the drains is a most harmful as well as painful pro-

cedure, and it cannot be too often impressed upon the dresser that the gauze will come away of itself in time; it is only for the purpose of accelerating the cure and of keeping the wound fresh that nature should be thus assisted.

When the gauze has been removed it requires nice judgment to know how much to replace—this can only be learned by experience; if too much is replaced the healing of the sinus is delayed, and intestinal obstruction may be produced; if too little, a residual abscess may form in some pocket not efficiently drained; or rarely, where the adhesions are firm, intestinal obstruction may ensue from kinks of the bowel occurring from its sudden expansion on the removal of pressure.

A faecal fistula may be regarded as of good prognostic import as far as life is concerned, as was mentioned before, and it has seldom failed to heal spontaneously, though, of course, delaying ultimate recovery. If it does not heal of itself it is better for the patient to endure the necessary discomfort until he is thoroughly convalescent, as a second laparotomy during typhoid fever is to be avoided if possible. If a second perforation occur, nevertheless, a second laparotomy must be performed and similar treatment instituted. The same remark applies to intestinal obstruction from bands or adhesions. Of eight cases where more than one operation has been performed, no fewer than three patients recovered (62.5 per cent. mortality), and, of these three, two endured three laparotomies.

EXPLORATORY LAPAROTOMIES.

Finally, a few words must be said about exploratory operations where the diagnosis is uncertain. Of twenty-six such operations where no peritoneal lesions were found, sixteen eventually recovered; only ten died, a mortality of 38.46 per cent. Of the nine fatal cases in which the duration of life after operation is known, only three died in less than twelve hours. Of these three, one (Finney) died from pulmonary embolism following iliac thrombosis; the second (J. F.

Mitchell) had had severe hæmatemesis and enterorrhagia shortly before operation, and was in a very precarious condition; while in the third case (Le Conte), which lived nearly seven hours after operation, the toxæmic state previously existing persisted without material change until death. In these three cases local anæsthesia was used, and in no way can the exploratory incision be held to have had any connection with the fatal termination.

This "laparotomie blanche," therefore, as it is named by Hagopoff, is practically never a cause of death, and, in our judgment, is to be recommended in all doubtful cases, especially as in some instances the irrigation of the peritoneal cavity employed has actually seemed to exert a beneficial influence on the course of the disease.

STATISTICAL SUMMARY.

ANALYSIS OF WHOLE NUMBER OF CASES.

Recovered	94
Died	268
Total	362
Mortality	74.03 per cent.

ANALYSIS OF CASES WHERE AGE AND SEX ARE KNOWN.

AGE.	MALE.			FEMALE.			TOTAL.			MORTALITY PER CENT.		
	Recov.	Died.	Total.	Recov.	Died.	Total.	Recov.	Died.	Total.	Male.	Female.	Total.
Under 10 years.	3	2	5	1	3	4	4	5	9	40.0	75.0	55.5
10-15 "	9	10	19	3	3	6	12	13	25	52.6	50.0	52.0
15-20 "	6	29	35	1	2	3	7	31	38	83.0	66.6	81.8
20-30 "	16	70	86	8	19	27	24	89	113	81.4	70.3	78.0
30-40 "	13	44	57	6	6	12	19	50	69	77.2	50.0	72.4
40-50 "	8	10	18	1	2	3	9	12	21	55.5	66.6	57.1
50-60 "	0	3	3	0	1	1	0	4	4	100.0	100.0	100.0
Total	55	168	223	20	36	56	75	204	279	75.3	64.2	73.1

ANALYSIS OF CASES ACCORDING TO SEX ALONE.

Sex.	Recovered.	Died.	Total.	Mortality.
Male	61	190	251	75.6 per cent.
Female	22	38	60	63.3 "

INTESTINAL PERFORATION IN TYPHOID FEVER. 41

ANALYSIS ACCORDING TO DURATION OF PERFORATION BEFORE OPERATION.

Cases operated on.	Recovered.	Died.	Total.	Mortality.
First 12 hours after perforation..	35	95	130	73.0 per cent.
Second " " "	22	62	84	73.8 "
Third " " "	2	29	31	93.5 "
Over 36 hours "	18	37	55	67.2 "

ANALYSIS OF CASES WHERE DATE OF OPERATION IS KNOWN.

Year.	Recovered.	Died.	Total.	Mortality.
1884	1	0	1	0.0 per cent.
1885	0	2	2	100.0 "
1886	0	1	1	100.0 "
1887	0	3	3	100.0 "
1888	0	3	3	100.0 "
1889	1	3	4	75.0 "
1890	0	1	1	100.0 "
1891	1	5	6	83.3 "
1892	0	1	1	100.0 "
1893	0	4	4	100.0 "
1894	4	11	15	73.3 "
1895	5	12	17	70.5 "
1896	6	15	21	71.4 "
1897	3	9	12	75.0 "
1898	10	25	35	71.4 "
1899	6	40	46	86.9 "
1900	14	18	32	56.2 "
1901	11	15	26	57.6 "
1902	16	21	37	56.7 "
1903	4	21	25	84.0 "

ANALYSIS ACCORDING TO LUSTRUMS.

Period of time.	Recovered.	Died.	Total.	Mortality.
1884-1888	1	9	10	90.0 per cent.
1889-1893	2	14	16	87.5 "
1894-1898	28	72	100	72.0 "
1899-1903	51	115	166	69.2 "

STAGE OF DISEASE IN WHICH PERFORATION OCCURRED.

Perforation occurring.	Recovered.	Died.	Total.	Mortality.
First week of the disease.....	4	2	6	33.3 per cent.
Second " "	16	43	59	72.8 "
Third " "	22	81	103	78.6 "
Fourth " "	11	33	44	75.0 "
Fifth " "	5	20	25	80.0 "
Sixth " "	3	3	6	50.0 "
After sixth week of disease.....	4	12	16	75.0 "
In a relapse.....	8	7	15	46.6 "
In third relapse.....	0	1	1	100.0 "
In convalescence	7	4	11	36.6 "

TIME ELAPSING BETWEEN PERFORATION AND OPERATION, IN DETAIL.

Operation performed.	Recovered.	Died.	Total.	Mortality.
Within a half-hour	0	2	2	100.0 per cent.
“ one hour.....	0	2	2	100.0 “
“ two hours.....	2	4	6	66.6 “
“ three hours.....	3	1	4	25.0 “
“ four hours.....	2	12	14	85.7 “
“ eight hours.....	17	39	56	69.6 “
“ twelve hours.....	12	34	46	73.9 “
“ eighteen hours.....	10	32	42	76.1 “
“ twenty-four hours.....	12	30	42	71.4 “
“ thirty-six hours.....	2	29	31	93.5 “
“ forty-eight hours.....	4	16	20	80.0 “
“ seventy-two hours.....	8	10	18	55.5 “
“ five days	4	9	13	69.2 “
“ two weeks.....	1	1	2	50.0 “
After two weeks.....	1	1	2	50.0 “

ANALYSIS AS TO THE PERFORATION.

I. Number of perforation.	Recovered.	Died.	Total.	Mortality.
Single	65	171	236	72.4 per cent.
Multiple	5	30	35	85.7 “
II. Size of perforation.				
Under $\frac{1}{8}$ inch	35	37	72	51.3 “
“ $\frac{1}{2}$ “	17	56	73	76.7 “
Over $\frac{1}{2}$ “	7	16	23	69.5 “
III. Site of perforation.				
Within 12 inches of cæcum ..	32	108	140	77.1 “
“ 24 “ ..	7	32	39	82.0 “
“ 36 “ ..	1	6	7	85.7 “
Over 3 feet from “ ..	1	3	4	75.0 “
IV. Perforation of:				
Cæcum or ascending colon....	1	4	5	80.0 “
Transverse colon	0	1	1	100.0 “
Sigmoid loop.....	0	1	1	100.0 “
Meckel's diverticulum	1	2	3	66.6 “
Appendix	4	4	8	50.0 “

TREATMENT OF GUT.

	Recovered.	Died.	Total.	Mortality.
Intestinal resection with end-to-end anastomosis	1	4	5	80.0 per cent.
Intestines evacuated through the perforation or a puncture.....	1	1	2	50.0 “
Enterotomy for tympany.....	1	5	6	83.3 “

INTESTINAL PERFORATION IN TYPHOID FEVER. 43

DURATION OF AFTER-TREATMENT IN FATAL CASES.

Time.	Cases.	Per Cent. of Whole Number.
Died on table.....	5	2.1
" under 1 hour	11	4.8
" " 4 hours	20	8.8
" " 8 "	24	10.4
" " 12 "	29	12.6
" " 18 "	15	6.5
" " 24 "	18	7.8
" " 36 "	17	7.4
" " 48 "	21	9.1
" " 72 "	23	10.0
" " 5 days	21	9.1
" " 1 week	7	3.1
Lived over 1 "	11	4.8
" " 2 weeks	3	1.3
" 30 days or more.....	4	1.8
Total	229	100.0

ANALYSIS AS TO DRAINAGE.

Cases.*	Recovered.	Died.	Total.	Mortality.
Requiring drainage	72	186	258	72.0 per cent.
Not requiring drainage.....	11	18	29	62.0 "

NUMBER OF OPERATIONS PERFORMED.

Cases.	Recovered.	Died.	Total.	Mortality.
More than one operation performed.	3†	5	8	62.5 per cent.

CASES DEVELOPING A FAECAL FISTULA AFTER OPERATION.

Time.	Recovered.	Died.	Total.
Within 24 hours	2	1	3
" 36 "	1	0	1
" 48 "	1	0	1
" 72 "	1	0	1
" 5 days	3	1	4
" 1 week	1	0	1
Over 1 "	1	0	1
" 2 weeks	2	0	2
Time unknown.....	2	0	2
Total cases.....	14	2	16
Mortality per cent.....			12.5

Treated by	Recovered.	Died.	Total.	Mortality.
Irrigation and drainage	46	130	176	73.8 per cent.
" but no drainage.....	7	15	22	68.0 "
No irrigation and no drainage.....	2	0	2	...
Wiping and drainage.....	12	19	31	61.0 "
" but no drainage.....	0	2	2	100.0 "
No wiping and no drainage.....	2	2	4	50.0 "
Drain, no wiping nor irrigation...	10	7	17	41.0 "
Wiping, irrigation, and drainage...	1	10	11	90.0 "
Eventration	3	8	11	72.0 "
False anus established.....	0	4	4	100.0 "

* Excluding cases where patient died on the table.

† Of the three patients who survived, two endured three operations.

	Recovered.	Died.	Total.	Mortality.
Ambulatory cases.....	7	16	23	69.5 per cent.
Relapse after operation.....	6	1	7	14.3 "
Two or more relapses after operation	2	0	2	0.0 "
With other complications.....	8	11	19	57.8 "
With a subsequent perforation....	0	12	12	100.0 "
With a second perforation not found at operation.....	0	3	3	100.0 "
Perforation not found.....	5	15	20	75.0 "
Intestinal sutures not holding.....	13	9	22	40.9 "
Supposed to have recovered from a previous perforation.....	0	2	2	100.0 "
Subsequent protrusion of bowel through wound.....	2	0	2	0.0 "

ANALYSIS AS TO SITE OF INCISION.

Site.	Recovered.	Died.	Total.	Mortality.
Median hypogastric.....	21	75	96	78.12 per cent.
Right iliac.....	44	97	141	69.5 "
Left iliac, abscess pointing.....	2	0	2	
Median epigastric.....	1	3	4	75.0 "
Right hypochondriac.....	0	1	1	100.0 "
Multiple incisions.....	3	11	14	78.5 "
Drainage through loin, flank, or vagina	1	4	5	80.0 "

ANALYSIS OF CAUSE OF DEATH IN EIGHTY-NINE CASES IN WHICH IT IS GIVEN.

Causes of Death after Operation.	Under Twelve Hours.	Under Twenty-four Hours.	Under Three Days.	Under One Week.	Under Two Weeks.	Over Two Weeks.	Total.	Per Cent. of Whole Number.
Pre-existent peritonitis.....	17	6	16	4	1	0	41	49.4
Toxæmia of typhoid fever.....	2	0	5	2	0	0	9	10.1
Peritonitis from subsequent perforation.	0	0	3	2	3	2	10	11.2
Exhaustion.....	0	0	0	1	3	1	5	5.6
Intestinal hæmorrhage	0	0	1	2	0	0	3	3.4
Intestinal obstruction.....	0	0	3	0	0	0	3	3.4
Other causes, uninfluenced by operation.	7	0	8	0	0	0	15	16.8

ANALYSIS OF MISCELLANEOUS LAPAROTOMIES DURING TYPHOID FEVER.

Operations for	Recovered.	Died.	Total.	Mortality.
Appendicitis	12	4	16	25.0 per cent.
Disease of gall-bladder.....	4	8	12	66.6 "
Abscess of liver.....	1	1	2	50.0 "
Diseases of pelvic organs.....	5	0	5	—
Suppurating mesenteric glands....	0	3	3	100.0 "
Intussusception	0	1	1	100.0 "
Chronic intestinal obstruction.....	1	0	1	—
Peritonitis of unknown cause.....	2	1	3	33.3 "

LIST OF CASES ANALYZED.

N.B.—References to Keen, from Nos. 1 to 83 inclusive, refer to the tables in "Surgical Complications and Sequels of Typhoid Fever," Philadelphia, 1898; from Nos. 84 to 158 inclusive, to the tables in "Surgical Treatment of Typhoid Fever," New York State Medical Association Transactions, 1899. References to Finney are to tables in Johns Hopkins Hospital Reports, vol. viii.

INTESTINAL PERFORATION.

No.	Operator.	Result.	Reference.
1.	Abbe.	Recov.	New York Med. Record, Jan. 5, 1895. Keen, 25. Finney, 1.
2.	"	Died.	Keen, Trans. New York State Med. Assoc., 1899. Keen, 85.
3.	"	"	Ibid. Keen, 84.
4.	Alexandroff.	"	Journ. de Clin. et Thérapeut. Infantiles, Paris, 1894, II. 735. Lactop. Chirurg. Obshtsh. v. Mosk., 1891, x. 121-129, in ANNALS OF SURGERY, 1897, I. 267. Keen, 27.
5.	Allen, D. P.	"	American Journ. Med. Sciences, January, 1902, p. 43.
6.	"	"	Ibid., p. 50.
7.	Aillingham.	"	Trans. Clin. Soc. London, vol. xxvii. Brit. Med. Journ., 1894, vol. I. p. 578. Keen, 24. Finney, 3.
8.	Anderson.	Recov.	Brit. Med. Journ., July 23, 1898. Keen, 86.
9.	Andrews.	"	ANNALS OF SURGERY, 1902, vol. xxxvi, p. 623.
10.	Armstrong.	Died.	Montreal Medical Journal, Feb., 1897, p. 601. Keen, 52. Finney, 4.
11.	"	"	Brit. Med. Journ., 1896, vol. II. p. 1621. Keen, 53.
12.	"	"	Ibid. Keen, 54.
13.	"	"	Ibid. Keen, 55.
14.	" (Reporter).	"	Ibid. Keen, 56.
15.	"	"	Ibid. Keen, 57.
16.	"	"	Ibid. Keen, 58.
17.	"	"	Keen, 79.
18.	Audet.	"	Archives de Méd. et de Pharmacie Milit., 1899, xxxiv., p. 134.
19.	"	"	Ibid.
20.	Auvray.	"	Bull. et Mém. de la Soc. Anat. de Paris, jan., 1901, p. 65.
21.	"	"	Ibid., p. 66.
22.	Balch.	"	Trans. Amer. Surg. Assoc., 1900, p. 419, Case 24.
23.	Ballance.	"	Cargill, Brit. Med. Journ., Dec. 15, 1900, p. 1738.
24.	Banzet.	"	F. Junqua, Thèse de Paris, 1901, p. 60.
25.	Bartleet.	"	Medical News, November, 1887.
26.	Beach.	"	Trans. Amer. Surg. Assoc., 1900, p. 410, Case 9. Boston Med. and Surg. Journ., Oct., 1898, p. 390. Keen, 87. (Age given here as fifteen years.)
27.	Beckett.	"	South. California Practitioner, 1899, xiv., 111. Keen, 88.
28.	Bell, James.	"	Medical Chronicle, September, 1895, p. 401. Keen, 18.
29.	"	"	Ibid. Keen, 21.

No.	Operator.	Result.	Reference.
30.	Berg.	Recov.	New York Medical Record, March 23, 1901, p. 441.
31.	Bigger.	Died.	British Medical Journal, 1899, vol. i. p. 89. Keen, 89.
32.	Blake.	"	Bost. Med. and Surg. Journ., Feb. 5, 1903, p. 149. Case 10.
33.	Bland-Sutton.	"	Trans. Clin. Soc. London, vol. xxvii. Brit. Med. Journ., 1894, vol. i. p. 578. Keen, 23. Finney, 96.
34.	Bocaloglu.	"	Mauger, Thèse de Paris, 1900, p. 101.
35.	Bogart.	"	ANNALS OF SURGERY, May, 1896. Keen, 44.
36.	Boinet.	"	Archives Gén. de Méd., October, 1899, p. 426. Mauger, Thèse de Paris, 1900, p. 109.
37.	" (Reporter.)	"	Archives Gén. de Méd., 1899, p. 542.
38.	" "	"	Ibid., p. 543.
39.	Bontecou.	"	Journ. Amer. Med. Assoc., Jan. 28, 1888, p. 106. Keen, 5.
40.	"	"	Ibid., March 29, 1890, p. 455. Keen, 11.
41.	Bowlby.	Recov.	Lancet, January 30, 1897, p. 312. Proc. Royal Med. and Chir. Soc. of London, vol. ix. Keen, 61.
42.	"	"	Lancet, January 10, 1903.
43.	Briddon.	Died.	ANNALS OF SURGERY, February, 1896, p. 198. Keen, 43.
44.	Briggs, C. E.	Recov.	Amer. Jour. Med. Sciences, January, 1902, p. 47.
45.	Brooks.	"	Trans. Amer. Surg. Assoc., 1900, p. 415. Case 17.
46.	Bruce.	"	Canada Lancet, March, 1902, abstracted in Amer. Med., May, 1902, p. 747.
47.	Brown, F. Tilden.	Died.	ANNALS OF SURGERY, March, 1903, p. 380.
48.	"	"	Ibid.
49.	"	Recov.	Ibid.
50.	Brun.	Died.	Bull. et Mém. de la Soc. de Chir. de Paris, nov. 25, 1896, p. 731. Keen, 60.
51.	Burrell.	"	Trans. Amer. Surg. Assoc., 1900, p. 417. Case 19.
52.	Blake, Jos. A.	"	Personal communication.
53.	"	Recov.	Ibid.
54.	Cameron.	Died.	Philadelphia Med. Journ., March 3, 1900, p. 526.
55.	Canoli.	"	Bull. de Soc. Lancisiana d. Osp. di Roma (1895), 1896, xv. l., 9-14. Quoted from Keen, 32.
56.	"	"	Ibid. Keen, 33.
57.	Cargill (Reporter).	"	Brit. Med. Journ., December 18, 1900, p. 1738.
58.	" "	"	Ibid.
59.	Celos.	"	Bull. et Mém. de la Soc. Anat. de Paris, mai, 1900, p. 503.
60.	Champlin.	Recov.	The Plexus, Chicago, 1899, No. 5, vol. v. p. 134. Keen, 155.
61.	"	Died.	Ibid. Keen, 156.
62.	"	"	Ibid. Keen, 157.
63.	Chevallier.	Recov.	Bull. et Mém. de la Soc. de Chir. de Paris, juin 11, 1902, p. 662.
64.	"	"	Ibid., p. 663.
65.	Cholzow.	Died.	Ann. der Russ. Chir., 1896, Heft 2, in Centralbl. f. Chir., 1896, No. 42. Keen, 59.

INTESTINAL PERFORATION IN TYPHOID FEVER. 47

No.	Operator.	Result.	Reference.
66.	Cushing, H.	Recov.	Johns Hopkins Hosp. Bull., 1898, vol. ix. p. 267. Ibid. Reports, vol. viii. p. 210. Keen, 90.
67.	"	Died.	Johns Hopkins Hosp. Reports, vol. viii. p. 218. Keen, 91.
68.	"	"	Ibid. Keen, 92.
69.	"	"	Phila. Med. Journ., March 3, 1900, p. 505. Keen, 93.
70.	"	Recov.	ANNALS OF SURGERY, 1901, vol. xxxiii. p. 550.
71.	Dalton.	Died.	Medical Review, St. Louis, 1898, vol. xxxviii. p. 392. Keen, 95.
72.	"	"	Ibid. Keen, 96.
73.	Dalziel.	"	Keen, Trans. New York State Med. Assoc. Keen, 97.
74.	"	"	Ibid. Keen, 98.
75.	"	"	Ibid. Keen, 99.
76.	"	"	Ibid. Keen, 100. Finney, 34.
77.	"	"	Ibid. Keen, 101.
78.	"	Recov.	Ibid. Keen, 102.
79.	Dandridge.	"	Keen, 28.
80.	"	Died.	Cincinnati Lancet-Clinic, Aug. 21, 1897, p. 177. Keen, 65.
81.	Da Costa.*	"	Allyn, Phila. Med. Journ., Aug. 3, 1901, p. 193. "Modern Surgery," 1903, 4th ed., p. 724.
82.	Davis, G. G.	Recov.	Univ. Med. Mag., May, 1900, p. 172. Episcopal Hospital Records, Philadelphia.
83.	"	Died.	Univ. Med. Mag., loc. cit., p. 173. Episcopal Hospital Records.
84.	"	"	Episcopal Hospital Records.
85.	"	"	Ibid.
86.	"	"	Ibid.
87.	"	"	Ibid.
88.	"	"	Ibid.
89.	Davis, R. T.	Recov.	Amer. Med., January 18, 1902, p. 116.
90.	Deanesly & Malet.	"	Lancet, May 25, 1901, p. 1466.
91.	Deaver, H. C.	Died.	Episcopal Hospital Records.
92.	"	"	Amer. Journ. Med. Sci., Feb., 1898, p. 191. Keen, 104.
93.	"	"	Episcopal Hospital Records.
94.	"	"	Ibid.
95.	"	"	Ibid.
96.	Deaver, J. B.	Recov.	Amer. Journ. Med. Sci., Feb., 1898, p. 191. Keen, 103.
97.	"	Died.	ANNALS OF SURGERY, 1898, p. 144. Keen, 105.
98.	Delore.	"	Mouriquand, Lyon Méd., juillet 12, 1903, p. 41.
99.	"	"	Ibid., p. 40.
100.	Depage.	Recov.	Journ. de Chir. et Annales de la Soc. Belge de Chir., November-December, 1902.
101.	Ellot.	"	Trans. Amer. Surg. Assoc., 1900, p. 415. Case 16. New York Med. Record, Dec. 22, 1900, p. 968. Keen, 94.
102.	Ferraresi.	"	Bull. de Soc. Lancisiana d. Osp. di Roma (1895), 1896, xv. 1., 9-14 (quoted in Keen). Keen, 31.

* See also Nos. 360, 361, and 362.

No.	Operator.	Result.	Reference.
103.	Ferrier.	Died.	Bull. et Mém. de la Soc. Méd. des Hôpitaux, fev. 8, 1901, p. 112.
104.	"	"	Ibid., p. 108.
105.	Finney.	"	ANNALS OF SURGERY, 1897, p. 233. Johns Hopkins Hospital Reports, vol. viii. p. 187. Keen, 66.
106.	"	"	Ibid., loc. cit. Keen, 67.
107.	"	Recov.	Ibid., loc. cit., p. 186. Keen, 68.
108.	"	Died.	Johns Hopkins Hosp. Reports, vol. viii. p. 187. Keen, 106.
109.	"	Recov.	Ibid., p. 188. Keen, 107.
110.	"	Died.	Osler, Phila. Med. Journ., Jan. 19, 1901, p. 116. Johns Hopkins Hospital Reports, vol. x., No. 8, p. 430, Case 17.
111.	"	"	Johns Hopkins Hospital Reports, loc. cit., Case 14, p. 420.
112.	Gerster.	Recov.	Berg, New York Med. Record, March 23, 1901, p. 443.
113.	Gesselewitch and Dombrowski.	Died.	Laltop. Russk. Chir., 1897, vol. ii. p. 407. (Quoted in Keen.) Keen, 69. Finney, 46.
114.	Gesselewitch and Wanach.	"	Ibid. Keen, 70. Finney, 50.
115.	Gesselewitch and Kadjanov.	"	Ibid. Keen, 71. Finney, 49.
116.	Gesselewitch and Wanach.	"	Ibid. Keen, 72. Finney, 48.
117.	Gesselewitch and Wanach.	"	Ibid. Keen, 73. Finney, 47.
118.	Gibbon.	Recov.	Pennsylvania Hospital Records.
119.	"	Died.	Ibid.
120.	"	"	Personal communication. St. Joseph's Hosp. Records, Philadelphia.
121.	"	"	Ibid. Polyclinic Hospital Records, Philadelphia.
122.	"	"	Pennsylvania Hospital Records.
123.	"	"	Ibid.
124.	"	"	Ibid.
125.	Godwin.	"	Thornton and Godwin, Lancet, August 17, 1901.
126.	Goodal & Richards.	"	British Med. Journal, 1898, vol. i. p. 1329. Keen, 136.
127.	Gosset.	"	Bull. et Mém. de la Soc. de Chir. de Paris, dec. 26, 1900, p. 119.
128.	Gray.	"	New York Med. Record, April 22, 1899, p. 567. Case 9. Keen, 108.
129.	Guinon (Reporter).	"	Revue Mensuelle des Malades de l'Enfance, juillet, 1899, p. 290.
130.	Hagopoff.	Recov.	Bull. et Mém. de la Soc. de Chir. de Paris, juin 18, 1902, p. 680.
131.	Haggard.	Died.	Trans. South. Surg. and Gyn. Congr., 1899, p. 148.
132.	Hahn.	"	Frank, Bellage zum Centralbl. f. Chir., 1888, vol. xxiv. p. 51. Keen, 9. Finney, 51.
133.	"	"	Ibid. Keen, 10. Finney, 52.
134.	Hare.	"	Intercolonial Quarterly Journ., Feb., 1895. Keen, 29.
135.	Harrison, V. W.	"	North Carolina Med. Journ., Dec. 5, 1897, p. 368. Keen, 82. Finney, 56.
136.	Harrisson.	"	Brit. Med. Journ., Oct. 20, 1894. Keen, 34.

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No.	Operator.	Result.	Reference.
137.	Harte.	Died.	Pennsylvania Hospital Records.
138.	"	"	Ibid.
139.	"	"	Ibid.
140.	"	Recov.	Episcopal Hospital Records.
141.	"	Died.	Pennsylvania Hospital Records.
142.	"	"	Ibid.
143.	"	"	Episcopal Hospital Records.
144.	"	"	Pennsylvania Hospital Records.
145.	"	Recov.	Ibid.
146.	"	"	Ibid.
147.	"	Died.	Ibid.
148.	"	"	Ibid.
149.	"	"	Ibid.
150.	"	"	Ibid.
151.	"	"	Ibid.
152.	"	"	Ibid.
153.	"	"	Ibid.
154.	"	Recov.	Ibid.
155.	"	Died.	Ibid.
156.	"	"	Ibid.
157.	Hayes.	"	Amer. Med., Sept. 6, 1902, p. 379.
158.	"	Recov.	Ibid.
159.	"	Died.	Ibid.
160.	"	Recov.	Ibid.
161.	"	"	Ibid.
162.	"	Died.	Ibid., p. 380.
163.	"	"	Ibid.
164.	Hearn.	"	Ibid., May 2, 1903, p. 700.
165.	Henneld.	"	Med. Rev., St. Louis, 1898, vol. xxxvii, p. 392. Keen, 109.
166.	Heurtreaux and Waquet.	Recov.	Mauger, Thèse de Paris, 1900, p. 112.
167.	Heuston.	"	Brit. Med. Journ., November 16, 1901.
168.	Hill, W.	"	Keen, 40.
169.	Hollis.	Died.	Lancet, 1896, vol. i. p. 1284. Keen, 50.
170.	Hotchkiss.	"	N. Y. Med. Journ., Jan. 11, 1896. Keen, 42. Finney, 59.
171.	Hutchinson, J. P.	Recov.	Pennsylvania Hospital Records.
172.	"	Died.	Children's Hospital Records, Philadelphia.
173.	"	"	Episcopal Hospital Records.
174.	"	"	Ibid.
175.	"	"	Lloyd and Coley, Phila. Med. Journ., Jan., 1903, p. 133 (Methodist Hospital Records, Philadelphia).
176.	"	Recov.	Episcopal Hospital Records.
177.	"	Died.	Pennsylvania Hospital Records.
178.	"	Recov.	Ibid.
179.	Hutchison, J. A.	Died.	Keen, 77. Finney, 60. Mauger, 70.
180.	"	"	Keen, 78.
181.	Hill, C. L.	Recov.	Petry, Phila. Med. Journ., Dec. 13, 1902, p. 936.
182.	Jackson.	Died.	N. Y. Med. Record, Oct. 7, 1899, p. 519. Keen, 110.
183.	Jones.	Recov.	ANNALS OF SURGERY, July, 1901.
184.	Kadjan.	"	Gesselewitch, St. Petersburg. med. Woch., 1898, n. f. 15, No. 3, s. 21.
185.	Kammerer.	"	Selbert, Archives of Pediatrics, Sept., 1902.
186.	Kholtzoff.	Died.	La Presse Méd., mai 18, 1898, p. 271.

No.	Operator.	Result.	Reference.
187.	Kimura.	Died.	Sel-i-Kwai Med. Journ., 1890, vol. ix. p. 55, quoted in Brit. Med. Journ., 1890, vol. ii. p. 777. Keen, 14.
188.	Kingsley.	"	ANNALS OF SURGERY, Mar., 1897, p. 233. Keen, 30. Finney, 63.
189.	Kirkpatrick.	"	Keen, 80.
190.	Korte.	"	Archiv f. klin. Chir., 1892, vol. xlv. p. 646. Keen, 19. Finney, 65.
191.	Kropowski.	Recov.	Gesselewitch, St. Petersburg. med. Woch., 1898, n. f. 15. No. 3, s. 23. Keen, 111.
192.	Laidley.	Died.	Amer. Journ. of Obst., Nov., 1895, p. 791. Keen, 38.
193.	Laplace.	"	Tyson, Trans. Coll. Phys. Phila., 1902, p. 133. Personal communication from Prof. Tyson.
194.	Le Conte.*	Recov.	ANNALS OF SURGERY, 1901, vol. xxxiii. p. 645.
195.	"	Died.	Pennsylvania Hospital Records.
196.	"	"	Ibid.
197.	"	"	Ibid.
198.	Legueu.	"	Mauger, Thèse de Paris, 1900, p. 107.
199.	"	"	Bull. et Mém. de la Soc. de Chir. de Paris, dec. 26, 1900, p. 1156.
200.	"	Recov.	Ibid., loc. cit., p. 1157. Loison, Revue de Chir., 1901, vol. xxiii. p. 179.
201.	Lejars.	Died.	Bull. et Mém. de la Soc. de Chir. de Paris, nov., 1895. Keen, 49. Finney, 68.
202.	"	"	Ibid., nov. 25, 1896. Keen, 76. Finney, 69.
203.	"	"	Ibid., dec. 26, 1900, p. 1158. Mauger, Thèse de Paris 1900, p. 97.
204.	Levison.	"	Voorsanger, Amer. Med., Aug. 22, 1903, p. 318.
205.	Loison.	Recov.	Bull. et Mém. de la Soc. de Chir. de Paris, dec. 5, 1900. Bull. et Mém. de la Soc. Méd. des Hôp. de Paris, février 8, 1901, p. 107. Revue de Chir., 1901, vol. xxiii. p. 181.
206.	Lothrop.	Died.	Munro, Bost. Med. and Surg. Journ., Feb. 5, 1903. Case 11.
207.	Lücke.	"	Deut. Zeits. f. Chir., 1886-1887, Bd. xxv. pp. 1-4. Med. News, Nov., 1887. Trans. Amer. Surg. Assoc., 1888, p. 422.
208.	Lund.	"	Warren, Trans. Amer. Surg. Assoc., 1900, p. 414. Case 14. Keen, 112. Finney, 70.
209.	"	"	Ibid., p. 403, Case 2.
210.	"	"	Ibid., p. 408. Bost. Med. and Surg. Journ., 1900, vol. i. p. 688, Case 5.
211.	Lutz.	Recov.	Med. Review, St. Louis, 1898, vol. xxxvii. 392. Keen, 113.
212.	"	"	Ibid. Keen, 114.
213.	"	Died.	Ibid. Keen, 115.
214.	Margarucci.	"	Bull. di Soc. Lanceliana d. Osp. di Roma, 1898, xviii. 319. Quoted by Keen. Keen, 116. Finney, 71.
215.	Marsden.	Recov.	Lancet, June 23, 1900.
216.	"	Died.	Ibid.

* Another patient operated on at the Pennsylvania Hospital by Dr. Le Conte is convalescent, six weeks having elapsed since operation.

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No.	Operator.	Result.	Reference.
217.	Martin, Edw.	Died.	Univ. Med. Mag., June, 1899, p. 502. Keen, 117.
218.	"	Recov.	Ibid. Keen, 118.
219.	McArthur.	Died.	ANNALS OF SURGERY, 1902, vol. xxxvi. p. 624.
220.	"	"	Ibid.
221.	"	"	Ibid.
222.	McReynolds	Recov.	Trans. Coll. Phys. Phila., 1902, p. 134. Personal communication.
223.	"	Died.	Proceedings of Phila. Acad. of Surgery, April 6, 1903. Personal communication.
224.	"	"	Ibid.
225.	"	"	Ibid.
226.	Miclescu.	Recov.	Therapeutische Monatshefte, Dec., 1902, p. 631.
227.	Mignon.	Died.	Loison, Revue de Chir., Paris, 1901, vol. xxiii. p. 179.
228.	Mikulicz.	Recov.	Volkmann's Samml. klin. Vorträge, No. 262. Chirurgie, April, 1884, No. 83. Keen, 1. Finney, 72.
229.	"	Died.	Verhandlungen der Deutschen Gesellschaft f. Chir., xviii Kongress, s. 324. Keen, 7. Finney, 74.
230.	Mitchell, C. F.	"	Pennsylvania Hospital Records.
231.	"	"	Ibid.
232.	"	Recov.	Ibid.
233.	Mitchell, J. F.	"	Johns Hopkins Hosp. Reports, vol. x. p. 403. Case 11.
234.	"	Died.	Ibid., p. 412. Case 12.
235.	"	Recov.	Ibid., p. 416. Case 13. Osler, Phila. Med. Journ., Jan. 19, 1901, p. 116.
236.	"	Died.	Johns Hopkins Hosp. Reports, vol. x. p. 423. Case 15.
237.	"	"	Ibid., p. 426. Case 16.
238.	Mixer.	"	Trans. Amer. Surg. Assoc., 1900, p. 410. Case 8.
239.	Monks.	"	Munro, Boston Med. and Surg. Journ., February 5, 1903, p. 149. Case 15.
240.	Monod.	"	Bull. et Mém. de la Soc. de Chir. de Paris, nov. 18, 1896. Keen, 62.
241.	"	"	Ibid., dec. 12, 1900.
242.	Moore, J. E.	"	Northwestern Lancet, 1898, vol. xviii. p. 135. Keen, 119.
243.	Morestin,	"	Mauger, Thèse de Paris, 1900, p. 104.
244.	Morton, T. G.	"	Medical News, Dec. 24, 1887, p. 730. Keen, 6.
245.	Mower-White.	Recov.	Lancet, January 26, 1901.
246.	Moynihan.	Died.	British Med. Journ., 1899, vol. i. p. 1097. Keen, 120.
247.	Munro.	"	Burrell and Bottomly, Boston City Hospital Reports, 1898, p. 126. Keen, 122. Finney, 78.
248.	"	"	Trans. Amer. Surg. Assoc., 1900, p. 409. Case 7. Bost. Med. and Surg. Journ., Feb. 5, 1903. Case 6. Keen, 121.
249.	"	"	Trans. Amer. Surg. Assoc., 1900, p. 409. Case 6. Bost. Med. and Surg. Journ., 1900, vol. i. p. 388. Case 6. Ibid., Feb. 5, 1903, p. 149. Case 9.
250.	"	"	Trans. Amer. Surg. Assoc., loc. cit. Case 12. Bost. Med. and Surg. Journ., loc. cit., 1903. Case 7.

No.	Operator.	Result.	Reference.
251.	Munro.	Died.	Trans. Amer. Surg. Assoc., loc. cit. Case 20. Bost. Med. and Surg. Journ., loc. cit. Case 8.
252.	"	"	Bost. Med. and Surg. Journ., loc. cit., p. 148. Case 1.
253.	"	"	Ibid. Case 2.
254.	"	"	Ibid. Case 3.
255.	"	"	Ibid. Case 4.
256.	"	"	Ibid. Case 5.
257.	Murphy.	"	Keen, 22.
258.	"	Recov.	Keen, 41.
259.	"	"	Journ. Amer. Med. Assoc., April 11, 1903, p. 978.
260.	Mühsam.	"	Deutsche med. Woch., 1901, No. 32, s. 534.
261.	Müller.	"	Deutsche Militärärztliche Zeitsch., 1901, vol. xxx. s. 501.
262.	Neillson.	Died.	Episcopal Hospital Records.
263.	"	"	Ibid.
264.	Nevison.	"	Amer. Journ. Med. Sciences, Jan., 1902, p. 39. Case 1.
265.	"	"	Ibid., p. 41. Case 2.
266.	Nichols.	"	Bost. Med. and Surg. Journ., Feb. 5, 1903. Case 12.
267.	Nutt.	Recov.	McCormick, Therapeutic Gazette, Aug. 15, 1903, p. 513.
268.	Ortmann.	Died.	Mikulicz, Verhandlungen der Deut. Gesell- schaft f. Chir., xviii Kongress, p. 324, Keen, 7. Finney, 74.
269.	Panton.	Recov.	ANNALS OF SURGERY, Aug., 1897, p. 219. Keen, 54.
270.	Parkin.	Died.	British Med. Journ., 1895, vol. i. p. 192. Keen, 37.
271.	Patteson.	"	Taylor, Dublin Journ. Med. Sci., Jan., 1901, p. 3.
272.	Pearson.	Recov.	British Med. Journ., vol. i. p. 1097. Keen, 125.
273.	Peyrot.	"	Mauger, Thèse de Paris, 1900, p. 25.
274.	"	"	Ibid., p. 98.
275.	Pick.	Died.	Trans. Clin. Soc. London, 1898, p. 234. Brit. Med. Journ., 1898, vol. i. p. 1328. Keen, 126.
276.	Platt, J. E.	Recov.	Lancet, Feb. 25, 1899, p. 505. British Med. Journ., 1899, vol. i. p. 345. Keen, 127.
277.	"	Died.	Ibid. Keen, 128.
278.	"	"	Ibid. Keen, 129.
279.	"	"	Keen, 130.
280.	"	"	Keen, 131.
281.	Pluyette.	"	Mauger, Thèse de Paris, 1900, p. 105. Archives Générales de Médecine, 1899, N. S., vol. ii. p. 539.
282.	Porter.	"	Boston Med. and Surg. Journ., April 15, 1897, p. 354. Trans. Amer. Surg. Assoc., 1900, p. 411. Case 10. Keen, 63 and 132. Fin- ney, 87.
283.	"	"	Trans. Amer. Surg. Assoc., 1900, p. 413. Case 13.
284.	Post.	"	Munro, Bost. Med. and Surg. Journ., Feb. 5, 1903. Case 14.
285.	Powers.	"	Keen, 134.

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No.	Operator.	Result.	Reference.
286.	Price, Jos.	Recov.	Canada Lancet, April, 1898, p. 386. Med. and Surg. Reporter, 1896, p. 577. Keen, 46. Finney, 88.
287.	"	"	Canada Lancet, 1897, vol. xxx. p. 385. Med. and Surg. Reporter, loc. cit. Keen, 135.
288.	"	"	Canada Lancet, April, 1898. Med. and Surg. Reporter, loc. cit. Keen, 45. Finney, 89.
289.	Rath.	Died.	Records of St. Timothy's Hospital, Roxborough, Phila.
290.	"	"	Ibid.
291.	"	"	Ibid.
292.	Ricard.	Recov.	Bull. et Mém. de la Soc. de Chir. de Paris, juin 18, 1902, p. 680.
293.	Ricketts.	Died.	Cincinnati Lancet-Clinic, April 6, 1895, p. 383. Keen, 36.
294.	Rochard.	"	Bull. et Mém. de la Soc. de Chir. de Paris, dec. 26, 1900, p. 1161.
295.	"	"	Ibid.
296.	Rodman.	Recov.	Amer. Med., Nov. 23, 1901.
297.	Rogers.	Died.	Trans. South. Surg. and Gyn. Congress, 1899, p. 148.
298.	Ross, G. G.	"	Philadelphia Med. Journ., May 2, 1903, p. 748.
299.	Routier.	"	Bull. et Mém. de la Soc. de Chir. de Paris, dec. 26, 1900, p. 1161. Ibid., nov. 18, 1896, p. 728. Keen, 51.
300.	Ryan.	"	Australasian Medical Gazette, 1899, vol. xviii. p. 334. Keen, 137.
301.	Sacquépée.	"	Bull. et Mém. de la Soc. Anat. de Paris, 1899, vol. lxxiv. p. 443. Mauger, Thèse de Paris, 1900, p. 99.
302.	Saleeby.	Recov.	Phila. Med. Journ., Aug. 5, 1889, p. 270. Keen, 158.
303.	Senn.	Died.	Medical News, June 8, 1889, p. 622. Keen, 12. Finney, 93.
304.	"	"	Keen, 139.
305.	"	Recov.	Keen, 140.
306.	"	Died.	Keen, 141.
307.	Shepherd, F. J.	Recov.	Edinburgh Med. Journ., 1902, vol. liv. p. 531.
308.	"	"	Ibid., p. 532.
309.	"	"	Ibid., p. 534.
310.	Shoemaker, G. E.	Died.	Phila. Med. Journ., May 31, 1902, p. 981. Trans. Coll. Phys. Phila., 1902, p. 127.
311.	Sieur.	"	Lolson, Revue de Chir., Paris, 1901, vol. xxiii. p. 179.
312.	Sifton.	Recov.	Chicago Clin. Review, April, 1895. Keen, 48. Finney, 94.
313.	Soulligoux.	Died.	Mauger, Thèse de Paris, 1900, p. 102.
314.	"	"	Ibid., p. 103.
315.	Stewart, F. T.	"	Pennsylvania Hospital Records.
316.	"	"	Ibid.
317.	"	"	Ibid.
318.	"	Recov.	Ibid.
319.	"	Died.	Personal communication. Records of Polyclinic Hospital, Philadelphia.
320.	"	"	Ibid. Records of Jefferson College Hospital, Phila.
321.	Spellissy.	Recov.	Proceedings of Phila. Acad. of Surg., April 6, 1903

No.	Operator.	Result.	Reference.
322.	Surmay.	Died.	L'Union Méd., 1885, vol. xl. p. 901. Keen, 3.
323.	Taylor, H. M.	"	Virginia Med. Semi-monthly, Dec. 10, 1897, p. 516. Trans. South. Surg. and Gyn. Congr., 1899, p. 140. Case 1. Keen, 83.
324.	"	Recov.	Virginia Med. Semi-monthly, 1898-1899, vol. iii. p. 719. Trans. South. Surg. and Gyn. Congr., loc. cit., p. 142. Case 3. Keen, 142.
325.	"	Died.	Virginia Med. Semi-monthly, loc. cit. Trans. South. Surg. and Gyn. Congr., loc. cit., p. 142. Case 2. Keen, 143. Finney, 98.
326.	"	"	Maryland Med. Journ., 1899, vol. xlii. p. 101. Trans. South. Surg. and Gyn. Congr., loc. cit., p. 143. Case 4. Keen, 144.
327.	"	"	Trans. South. Surg. and Gyn. Congr., loc. cit.
328.	Taylor, W.	"	Dublin Journ. Med. Science, Jan., 1901, p. 1.
329.	Taylor, W. J.	"	Trans. Coll. Phys. Phila., 1899, p. 107. Keen, 145.
330.	"	"	Ibid., p. 108. Keen, 146.
331.	Thermet.	"	Monod & Vanverts, Revue de Chir., 1897, vol. xvii. p. 169, where it is quoted from Barbe. Thèse de Paris, Obs. 20.
332.	Thompson.	"	Trans. Amer. Surg. Assoc., 1900, p. 412. Case 11. Keen, 133.
333.	Thompson, J. E.	"	Trans. Texas State Med. Assoc., 1893, p. 266. Med. Chron., 1895, p. 401. Keen, 20. Finney, 101.
334.	"	"	Med. Chron., loc. cit. Keen, 39. Finney, 100.
335.	Thorndike.	"	Trans. Amer. Surg. Assoc., 1900, p. 406. Case 1.
336.	"	"	Ibid., p. 416. Case 18.
337.	"	Recov.	Boston Med. and Surg. Journ., Feb. 5, 1903. Case 13.
338.	Thurston.	"	Lancet, Oct. 14, 1899. Ibid., Feb. 1899, p. 1004. Keen, 148.
339.	Tiffany.	Died.	Keen, 147. Finney, 102.
340.	Trojanoff.	Recov.	Bohnitschnaia Gasetta Botkina, No. 23, 1894, abstracted in Med. News, 1894, vol. lxxv. p. 609. Junqua, Thèse de Paris, 1901. Case 61. Keen, 26, 124.
341.	"	Died.	Laltop. russk. Chir., 1897, vol. ii. p. 277, in Mauger, Thèse de Paris, 1900. Case 16. Keen, 74 and 123. Finney, 103.
342.	Valence.	"	Loison, Revue de Chir., Paris, 1901, vol. xxiii. p. 179.
343.	Van Duyn.	"	Keen, 149.
344.	Van Hook.	Recov.	Med. News, Nov. 21, 1891, p. 591. Keen, 15. Finney, 104.
345.	"	Died.	Ibid. Keen, 16. Finney, 105.
346.	"	"	Ibid. Keen, 17. Finney, 106.
347.	Wagner.	Recov.	Bellage z. Centralbl. f. Chir., 1889, No. 29, p. 66. Keen, 13. Finney, 107.
348.	Wanach.	Died.	Gesselewitch, St. Petersburg med. Woch., 1898, iii. n. f. 15, 23.
349.	Watson, F. S.	Recov.	Boston City Hosp. Reports, 1898, p. 127. Bost. Med. and Surg. Journ., 1896, No. 13. Ibid., 1900, vol. i. p. 688. Case 4. Trans. Amer. Surg. Assoc., 1900, p. 407. Case 4. Keen, 47.

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No.	Operator.	Result.	Reference.
350.	Watson, F. S.	Died.	Trans. Amer. Surg. Assoc., 1900, p. 414. Case 15.
351.	Warren, J. C.	"	Ibid., p. 407. Case 3.
352.	Weir.	"	ANNALS OF SURGERY, Dec., 1897. Keen, 81. Finney, 110.
353.	Willard.	"	Ibid., 1899, vol. xxix. p. 503. Keen, 151.
354.	v. Winiwarter.	"	Polls, Annal. de la Soc. Méd. Chlr. de Liege, 1897, vol. xxxvi. p. 266. Keen, 152. Finney, 86.
355.	Wladisslew.	Recov.	Gesselewitch, St. Petersburg med. Woch., 1898, vol. iii., n. f. 15, 23. Keen, 153.
356.	Woodward.	Died.	Boston Med. and Surg. Journ., 1898, vol. cxxxix. p. 544. Keen, 154.
357.	Yule.	Recov.	Edinburgh Med. Journ., 1899, vol. xlvii. p. 360.
358.	"	Died.	Ibid., p. 361.
359.	Zeidler.	"	Netschajeff, Bolnitsch. Gas. Botk., 1894, p. 569; in Keen, 75.
360.	Da Costa.	"	"Modern Surgery," 4th ed., 1903, p. 724.
361.	"	"	Ibid.
362.	"	"	Ibid.

Mackenzie has reported (Lancet, September 26, 1903, p. 867) two recoveries after operation by Battle for typhoid perforation. These are not included in the above tables.

EXPLORATORY LAPAROTOMIES.

1.	Armstrong.	Recov.	Lafleur, Montreal Med. Journ., Feb., 1901, p. 89.
2.	Auvray.	Died.	Bull. et Mém. de la Soc. Anat. de Paris, jan., 1901, p. 68.
3.	Berg.	Recov.	New York Med. Record, March 23, 1901, p. 443.
4.	Briggs.	"	Amer. Journ. Med. Sciences, Jan., 1902, p. 45.
5.	Bull.	"	New York Med. Record, June 1, 1901, p. 873.
6.	Cushing, H.	"	Johns Hopkins Hospital Reports, vol. viii. p. 226.
7.	"	Died.	Philadelphia Med. Journ., March 3, 1900, p. 507.
8.	Davis, G. G.	Recov.	Univ. Med. Mag., May, 1900, p. 171.
9.	Finney.	Died.	Philadelphia Med. Journ., March 3, 1900, p. 503.
10.	Garrow.	Recov.	Hamilton, Montreal Med. Journ., Feb., 1901, p. 93.
11.	Harrisson.	"	British Med. Journ., Oct. 20, 1894, p. 865.
12.	Harte.	"	Pennsylvania Hospital Records.
13.	"	"	Ibid.
14.	Le Conte.	Died.	Ibid.
15.	Mitchell, C. F.	Recov.	Ibid.
16.	Mitchell, J. F.	"	Johns Hopkins Hosp. Rep., vol. x., No. 8, p. 453. Case 21.
17.	"	"	Ibid., p. 447. Case 19.
18.	"	Died.	Ibid., p. 450. Case 20.
19.	Mixter.	Recov.	Trans. Amer. Surg. Assoc., 1900, p. 419. Case 23.
20.	McArthur.	Died.	ANNALS OF SURGERY, 1902, vol. xxxvi. (mentioned at p. 622 by Dr. Frank Billings).

No.	Operator.	Result.	Reference.
21.	Munro.	Died.	Boston Med. and Surg. Journ., Feb. 5, 1903. Case 18.
22.	"	"	Ibid. Case 19.
23.	Nimler.	"	Loison, <i>Revue de Chir.</i> , Paris, 1901, vol. xxiii, pp. 177 and 188.
24.	Roichard.	Recov.	Bull. et Mém. de la Soc. de Chir. de Paris, dec. 26, 1900, p. 1161.
25.	"	"	Ibid.
26.	Rodman.	Died.	Proceedings of Phila. Acad. of Surgery, April 6, 1903.

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- ¹ Morgagni. De sedibus et causis morborum, Epist. i., art. 2. Berthomieu: *Annales de la médecine physiologique*, Paris, 1822, i. 392-398. Corrin: *Archives générales de médecine*, Paris, 1831, xxv. 36-60. Ramsay: *American Journal of the Medical Sciences*, 1836, xviii. 52. Louis: *Archives générales de médecine*, Paris, 1823, i. 17-49. Howship: *Pract. Obs. in Surgery*, London, 1816, p. 264, etc.
- ² *Practice of Medicine*, fourth edition, vol. i. p. 329.
- ³ Nothnagel's *Encyclopædia*, loc. cit.
- ⁴ *Principles and Practice of Medicine*, New York, 1899.
- ⁵ *Pepper's System*, loc. cit.
- ⁶ *Philadelphia Medical Journal*, January 19, 1901.
- ⁷ Yates. *American Medicine*, May 2, 1903.
- ⁸ Quoted in Thatcher's article on "Typhoid Fever," in the *Twentieth Century Practice of Medicine*, 1899, vol. xvi. p. 586, New York.
- ⁹ Flexner. *American Journal of the Medical Sciences*, August, 1903. Yates: *American Medicine*, May 2, 1903.
- ¹⁰ T. K. Holmes. *Journal of the American Medical Association*, March 14, 1903.
- ¹¹ *Philadelphia Medical Journal*, March 3, 1900, p. 505.
- ¹² *Ibid.*, May 2, 1903.
- ¹³ *American Journal of the Medical Sciences*, May, 1903.

THE MIXED TUMORS OF THE SALIVARY GLANDS.

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It has long been known that the tumors of the salivary glands possess, as a rule, a very peculiar morphology which does not correspond to the structure of the tumors found in other organs. The greater number of the salivary tumors belong to a class known as mixed or, what is perhaps better, complex tumors; that is, new growths containing a considerable variety of tissues generally regarded as of mesoblastic origin, such as cartilage, myxomatous tissue, fat, and lymphoid structures. The parenchyma cells, proper, resemble morphologically either connective-tissue cells, in which case the tumors are considered as sarcomata, or endothelial cells, in which case the growths have long been called endotheliomata.

Beside these definitely mesoblastic structures these complex growths contain cells which resemble epithelial, endothelial, or connective-tissue cells, and accordingly the tumors have been considered as of epithelial, endothelial, or of a sarcomatous nature. These cells, which for convenience may be designated as parenchymal to distinguish them from the cells of the stroma, are present in greater or less abundance in the new growths, and give them their peculiar morphology. The variations which exist in the proportions between the stroma and the parenchyma and in the morphology of the cells of the stroma and parenchyma have given rise to much confusion in the classification of these tumors, and have rendered difficult the exact determination of their histogenetic relationships.

Pathologists have endeavored to escape responsibility by

coining compound titles to include all the forms of tissues found in such a complex growth; thus, adeno-myxo-chondro-sarcoma has frequently been used to designate tumors of this group. This additive method of naming tumors is quite unscientific, and gives no just idea of the pathological relations of the growth nor of its clinical character. Hansemann has carried it to an extreme. He proposes the following division of the mixed tumors which are at present generally considered to be of endothelial origin:

1. Endothelial Carcinoma.
2. Endothelial Sarcoma.
3. Endothelial Carcinosarcoma.
4. Endothelial tumors with development of special parts of the stroma. (*a*) Cylindroma; (*b*) Myxoma; (*c*) Chondroma; (*d*) Scirrhus; (*e*) Mixed forms with transition into sarcoma or carcinoma.
5. Endothelial Adenoma.

The question immediately arises in connection with the use of such a scheme of classification as to the distinctive morphology of an endothelial tumor and of endothelium. The originator of the term endothelium was His, in 1865; and by it he denoted the cellular linings of the serous cavities, of the blood-vessels, synovial membranes, lymph spaces, etc. Golgi then applied the term to certain tumors derived from the meninges and called them endotheliomata. Much opposition has arisen of late among embryologists to the use of the word endothelium as designating a particular group of lining cells, and the general trend of opinion is to replace it by epithelium. Thus, Stöhr calls the cells lining the blood-vessels, epithelium; and Hertwig has shown that the probable derivation of the flat cells lining the *cœlom* cavity is from the hypoblastic layer of the embryo, and that therefore these cells should be called epithelial. This view is shared by Klaatsch in a paper on the classification of tumors on an embryological basis. The French school also are inclined to call all flat covering cells epithelium, and for consistency, therefore, tumors arising from these cells, carcinomata or adenomata. Minot and Kollman, on the other hand,

consider the lining cells of the cœlom cavity and of the blood-vessels and lymph spaces as mesoblastic in origin, and therefore endothelium. Marchand would limit the term endothelium to the vascular linings and call all other lining cells, surface cells (Deckzellen). The name epithelium he considers should be restricted to all cells, without regard to their origin, which line hollow spaces and free surfaces, these cells lying closely together without well-developed interstitial substance. He suggests as a suitable word for all the surface layers of cells (Deckschichten) the Greek derivative, *epithem*.

In the mixed tumors of the salivary glands the parenchymal cells are arranged in long anastomosing strands which often form alveoli lined with one or more layers of flat cells. The difficulty which has arisen in the classification of these tumors lies chiefly in the determination of the histogenetic relationships of these cells. For many years they have been assumed to be derived from cells lining the connective-tissue spaces, and solely from morphological considerations have been regarded as endothelial cells and of mesoblastic origin. Now, inasmuch as the embryological status of the cells lining the lymph spaces has never been determined, a double assumption is made in ascribing to the cells of the mixed tumors an endothelial origin, for not only must the adherent of the endothelial theory show that the tumor cells are derived from the cells lining the tissue spaces, but he must also show that these cells are of mesoblastic origin, and therefore not epithelium. The chief exponent of the endothelial theory has been Rudolf Volkmann, who in 1895 published an important monograph on the endothelial tumors. Since that time the interest in this peculiar group of tumors has greatly increased, and numerous papers have appeared describing mixed tumors from various portions of the body, the writers accepting, as a rule, the general classification laid down by Volkmann and the morphological criteria which he assumed for the differentiation of the epithelial and endothelial growths. The following extract from Volkmann's monograph defines his position on the subject: "The characteristic morphological peculiarities of the endothe-

lial tumors lie in the arrangement of the tumor cells in strands and tubules, which distinguishes the growths from the sarcomata and gives them a close resemblance to the carcinomata. The cells of the tumors are often in very close relationship with the connective tissue of the spaces in which the cells lie, as evidenced by the fact that the cells remain attached to the walls of the space and do not retract when the tumor is hardened in fixing fluids, as is usual in the carcinomata. The cells of the endothelial tumors line the walls of the tissue spaces without the intervention of a layer of normal endothelial cells, such as is seen in the carcinomata where metastases extend along the lymph spaces. The cartilage of the endothelial tumor arises from the fibrous connective-tissue stroma by a softening of the intercellular substance, and the production first of a myxomatous tissue which later develops cartilage and a homogeneous intercellular tissue. Cell masses of an endothelial nature may also develop from the cartilaginous or myxomatous areas; and in many cases the spindle cells of the connective-tissue stroma must be regarded as genetically equivalent to the endothelial cells of the solid strands and tubules." According to Volkmann, the cells of the peripheral lymph spaces assume an active part in the growth of the tumor and, by their proliferation, form fresh extensions of the new growth. This has been shown to be doubtful both by Ribbert and Borst, who state that the cells of the tumor either grow into a tissue space and line the walls with flat cells or may grow over the pre-existing endothelial cells and produce the appearance of a proliferation of the endothelial cells, a condition also seen in the peripheral growth of the carcinomata. Glandular structures and growths of a carcinomatous nature are never found in the mixed tumors; all such appearances are due to modifications in morphology of the endothelial cells of such growths.

Pathologists of the French school have, however, never accepted the current view of the essentially mesoblastic origin of the cells of the tumors of the salivary glands, and have regarded the cells as derived from the epithelium of the glands, or, in the case of the pharyngeal and buccal tumors, as derived

from the small glands of the buccal mucosa. The majority of the French observers are satisfied to consider the mixed tumors as adenomata or carcinomata, and have described many of the simpler forms of the mixed tumors under this designation, reserving the name of mixed tumor for the more complicated growths containing bone or cartilage. This theory of the carcinomatous nature of these growths fails in several particulars. From a morphological point of view, if the tumors are carcinomata of the salivary glands it should be possible to trace some connection between the glandular structures and the tumor, as is sometimes possible in early growths of other glands of the body; but experience has shown that the tumors of this group are in a very large majority of cases encapsulated, and show no connection with the gland; indeed, they are often at some distance from it. From a clinical point of view, it is difficult to explain why the carcinomata of the salivary glands should differ so much in their clinical features from the carcinomata of other glands; for it is well known that these tumors may be present for twenty or thirty years without giving rise to cachexia or involving the surrounding structures. The theory of direct epithelial derivation also does not explain the presence of embryonic structures nor of cartilage; the latter tissue being present in a large proportion of these tumors. Finally, true carcinomata of the salivary glands have been observed with a morphology corresponding to those arising in the other epithelial glands and with a clinical course which is considered as characteristic of carcinoma; that is, a rapid and progressive involvement of the surrounding structures and an early invasion of the regional lymph nodes.

Pitance, in his thesis published in 1897, suggests that the direct derivation of the parenchymal cells of the mixed tumors from the highly differentiated glandular epithelium is improbable, even from a morphological stand-point, and that it is much more likely that the epithelium forming the cells of the tumor is derived from masses of cells left in or about the glands during the process of development. This mode of derivation might then explain the clinical peculiarities and the presence of

cartilage and embryonal tissues; the rudiments of which might have been left at the same time that the deposition of the glandular epithelium took place. The fact that the epithelial cells have not been in a position to develop functionally might also account for their alteration into an indifferent type not resembling very closely the normal cells of the fully functioning salivary gland. This view, merely suggested as an hypothesis, has not been generally adopted by pathologists.

An important paper on the salivary tumors by Hinsberg appeared in 1899, in which this author developed much the same idea as that of Pitance, but in greater detail and as the result of a large amount of embryological research on the anatomical conditions underlying the development of the salivary glands. He points out that in all of the nine tumors which he examined definite epithelial structures could be demonstrated. In itself this was not a new observation, as Nasse, Volkmann, Mauclaire, Cavazzani, and others had figured and described pearl formation in tumors, which they, however, regarded as endothelial in nature. Cavazzani even figures spine cells, which, however, he considers as of endothelial origin. The importance of Hinsberg's work lay in the evidence which he adduced to show the very intimate relations of the parotid and the submaxillary glands to the mesoblastic structures of the first and second branchial arches.

Wilms, in a recent paper, entirely agrees with Hinsberg in considering the parenchyma of the mixed tumors as of epithelial origin, but differs from him in the embryological interpretation of some of the morphological findings in the tumors.

Landsteiner has recently published an article in which he analyzes the results of the examination of twenty-seven tumors, chiefly from the salivary glands, among them an adenoma of the parotid. Of twenty-six mixed tumors examined, he found squamous epithelium and prickle cells in ten. The epithelial remnants were found in five tumors of the parotid, in one of the submaxillary, in two of the lip, one each of the palate and the neck. All but one of the tumors containing epithelium also contained cartilage.

Ribbert, in his text-book on general pathology, and Lubarsch, in his numerous critical reviews of the subject of tumors, are both very guarded in the expression of their ideas on the origin of the cells of the so-called endothelial tumors. Ribbert especially considers the salivary mixed tumors as in all probability of epithelial origin, and his views on the general subject of endothelial new growths may be illustrated by the following quotation: "It is customary to make a diagnosis of endothelioma when, in spite of the carcinomatous arrangement of the cells, the organ in which the growth is found lacks epithelial cells. But it is to be remembered that developmental remains of epithelial tissue may be found in abnormal places; such as flat epithelium in the deep connective tissues of the neck, derived from the branchial clefts, or fragments of pancreas in the walls of the stomach or duodenum. It is quite probable that many of the so-called endotheliomata are in reality of epithelial nature; for it is exceedingly difficult at times to decide whether the cells occupy a tissue space or a lymphatic vessel. When an endothelial tumor reaches a certain size, new connective tissue and blood-vessels begin to be formed, and the resulting picture may vary greatly from the original growth. The cells then grow in more or less closely packed strands and, with the diminished fibrous tissue, a deceptive alveolar structure may be obtained in sections. A further appearance due to growth is the increasing closeness of relationship to the blood-vessels. The cells may become arranged in layers around these, giving a picture of angiosarcoma."

The remainder of the papers which have appeared during the past six years favor the view that the cells of the parenchyma are of endothelial derivation.

The evident and extreme diversity of opinion concerning the classification of the mixed tumors of the salivary glands, and the peculiar interest which attaches to them from their rarity and complicated structure, led the writer to examine a large number of growths which may properly be included in the class of mixed tumors. In the course of this study complex tumors were examined from the salivary glands, the lips, the

palate, the orbit, the antrum of Highmore, the lachrymal gland, the thyroid, kidney, ovary, testicle, and lung, as well as examples of some of the simpler types of endotheliomata from the meninges, the pleura, and the peritoneum. It seemed best to limit the present paper to the consideration of the tumors of the buccal and the salivary group, inasmuch as the embryological conditions underlying the formation of the tumors of other organs, especially the testicle and kidney, differ greatly from those connected with the origin of the salivary mixed tumors. The writer has been indebted for some of his material to the surgeons of several of the New York hospitals, and he wishes to express his obligation to Dr. Robert Abbe in allowing him to use the records of six cases; to Dr. Francis H. Markoe for the use of five cases; to Dr. Charles McBurney for the use of eight cases; to Drs. B. F. Curtis and C. L. Gibson for three cases each; to Dr. J. H. Blake for two cases; and to Dr. F. W. Murray for one case. Case XXV was kindly given to me by Dr. F. S. Matthews. Four other cases were put at my disposal by Dr. J. H. Larkin, to whom I am under obligation for slides and material from his large collections of mixed tumors. The other twenty-seven tumors are from the collection of the Department of Pathology, College of Physicians and Surgeons, Columbia University, the large material of which was put at my disposal through the kindness of Professor T. M. Prudden, whom I also wish to thank for much assistance and advice during the progress of this study. Of the total of fifty-nine tumors from the salivary glands, lip and pharynx, selected for this report, fifty-four may be considered as undoubted mixed tumors of the so-called endothelial type. Two might perhaps be considered by most observers as sarcomata; one may possibly be an adenoma, though it does not resemble other adenomata in my collection, which are undoubted growths of an epithelial nature. Case II is not a mixed tumor in the strict sense of the term, but is of interest from an embryological point of view.

No attempt has been made to give a full clinical and anatomical description of each case, as a long series of such reports

can be found in Volkmann and the other German writers just mentioned. No morphological description, however complete, will enable one to appreciate as much of the appearance of a tumor as a drawing, so that frequent references have been made to the plates instead of giving the microscopic details in full.

It will be frequently noted during the description of the morphology of the individual tumors, that references will be made to drawings from other specimens. This is necessary simply for economy in the number of plates. A considerable number of the drawings are intended as types, and will be referred to as such. For example, Plates I and VI, Fig. 1, though not drawn from the same tumor, show a morphology which is characteristic of a large number of the mixed tumors, and which may be designated as typically endothelial in nature.

DETAILS OF CASES.

CASE I.—St. Luke's, No. 2. Parotid tumor. The growth was removed from the left cheek of a male, aged thirty-nine years. The tumor had been noticed for two years, during which time it had grown slowly. The growth was hard, painless, and freely movable.

When removed the tumor was found to be roughly spherical. The surface was slightly lobular and smooth. A distinct capsule is present of from one to three millimetres in thickness. A portion of the parotid gland is still adherent to the dorsal aspect of the mass. The tumor measures roughly four by three by two centimetres.

The parenchyma of the growth is arranged in solid strands and in alveoli. The strands spread out in all directions through a soft cellular connective tissue and lose themselves in it. (Plates I and VI, Fig. 1.) The cells of the strands are spindle or oval in shape with large nuclei. The chromatin of the nuclei is evenly distributed, so that a net-work is not easily made out. From the tapering ends of the strands the cells often give off long filaments to the surrounding connective tissue. The alveoli are small and oval in shape. They often lie in the course of one of the solid strands. The centre of the strands is filled with a mucous mass staining blue with hæmatoxylin. In some places the alveoli are

suggestively like the alveoli of a secreting gland; but the general type of the growth is that which has been called endothelial. There are no pearls or spine cells in the sections examined. There is no cartilage. Elastic tissue is abundant. The remains of the gland which are attached to the growth are normal. The morphology of the tumor is similar to that shown in Plate I, Fig. 1. No recurrence of the growth has taken place after five years.

CASE II.—St. Luke's, No. 727. The tumor was removed from a seven-months-old female infant. The growth was noticed soon after birth, and its progress was slow for two months and then became very rapid. The tumor lies on the left side of face and neck over the parotid gland, with which it is in contact. Numerous dilated veins can be seen on its surface. It is easily reduced in size by pressure. It measures before removal seven by four by five centimetres. On gross examination after removal, the tumor is composed of fat tissue and soft fibrous tissue. The vessels are not very noticeable in the hardened specimen. There is no capsule.

Microscopic examination shows a diffuse cellular growth composed chiefly of oval and spindle cells. The tissue resembles embryonic connective tissue rather than sarcoma. In the masses of spindle cells can be seen occasional alveoli of cylindrical epithelium entirely distinct from the rest of the growth, which resemble the alveoli seen in the tumors regarded as of endothelial nature. There is a moderate amount of fat scattered through the specimen. No cartilage is present; no form of degeneration either in cells or stroma. Elastic tissue is not abundant. This tumor, though perhaps not properly classed as an endothelioma, seems of sufficient interest to include here, for it is an excellent example of a congenital tumor of the parotid region containing fibrous tissue of a cellular, embryonic type, and also distinct epithelial remains derived in all probability from rudiments of the parotid. No recurrence in three years.

CASE III.—St. Luke's, No. 1675. Male, aged forty-one years, who fifteen years before had noted a small, hard nodule below and behind the right ear. The tumor was quite painless and not tender. The growth had gradually increased in size until it now measures twelve by eight centimetres. The growth has taken place in an anterior direction, so that the tumor now lies chiefly anterior to the ear, extending for some three centimetres

along the border of the inferior maxilla. The ear is pushed forward and upward by the tumor. The form of the growth is irregularly oval, and presents a number of cartilaginous nodules which project three or four millimetres above the surface. Other portions are cystic. The tumor is not adherent to the surrounding tissues. The neighboring lymph nodes are normal. The growth was removed by operation without difficulty, and no recurrence has been reported in two years.

The tumor when hardened measured seven by five by five centimetres. The cut section was pale yellow with small bluish nodules of hyaline cartilage scattered through its substance. There are many small, softened areas filled with myxomatous tissue. Some of these have broken down and formed small cysts. The capsule is of fibrous tissue about two millimetres thick and contains a few small vessels. The microscopical examination of the tumor showed it to be very largely composed of cartilage and soft embryonic connective tissue. The cellular portion of the growth was only moderate in amount.

The cartilage is in general purely hyaline, with a few oval cartilage cells in the stroma. In places, however, the connective and elastic tissue of the tumor invades the cartilage, and it becomes more cellular, and contains many long branching and spider cells, the prolongations of which join in with the fibrous tissue of the stroma. In some portions of the tumor and in the capsule the connective tissue is quite dense, but in general it is very loose and softened with mucous degeneration. Hyaline degeneration of the connective tissue is also seen to a very considerable extent, often extending over large areas, in which all trace of fibrillation is lost.

Weigert's stain for elastic fibres shows the whole growth to be traversed by a fine net-work of elastic fibres penetrating the cartilage and surrounding the alveoli of the parenchyma cells.

The parenchyma cells proper are of the so-called endothelial type. That is, they are oval or polyhedral cells with oval, deeply staining nuclei, which line small alveoli and tissue spaces. They are in intimate relation with the surrounding tissues, and may give off prolongations which are lost in the connective-tissue fibrillar among which the cells lie. There is no connective tissue between the cells when they lie in compact masses, nor does the elastic tissue pass between them under these conditions. Some of the alveoli contain masses of homogeneous hyaline material.

CASE IV.—St. Luke's, No. 1745. The tumor was removed from the left parotid region of a man of fifty-nine years, who first noticed the tumor fifty-three years ago. It was then the size of a small nut and freely movable. For many years the growth was exceedingly slow, but in the last few months it has been very rapid. The ear is pushed back by the growth. The tumor is very hard and adherent both to the skin and the deeper tissues. It cannot be moved in any direction. Its surface is smooth. In the neck are a few large hard nodes which have appeared recently. The patient's general condition is good.

The tumor was removed with some difficulty, as it was adherent to the deeper tissues, and a large number of the cervical lymph nodes had to be removed. When hardened, the mass measured six by seven by twelve centimetres. It is pear-shaped, with the larger portion above over the parotid. The cervical fat is filled with hard, enlarged lymph nodes. The internal surface, directed towards the parotid, is rough from separation of the tumor from the underlying tissues. The outer portion directed towards the surface is smoothly encapsulated, and there is a thin capsule between the tumor and the remnants of parotid tissue. The cut section shows two different appearances. The superficial portions are transparent, with faint yellow strands running through them, the deeper are opaque and white. The nodes are also opaque and white.

Microscopical examination of the growth shows a similar variability in the tumor. The peripheral portions possess the morphology designated as endothelial (Plate VI, Fig. 1), with a soft, fibrous stroma and long branching strands and alveoli, some of the latter filled with hyaline material. The deeper portions are composed of the same endothelial structures infiltrated with carcinoma. The carcinomatous growth resembles that of an infiltrating epithelioma rather than that of a glandular carcinoma, such as one would expect in a carcinoma of the parotid. The cells are large and flat, staining deeply with eosin. In some areas intercellular spines can be seen. Mitotic figures are fairly abundant. The parotid, which is separated from the growth by a fibrous capsule, is normal in appearance, and contains but little carcinomatous infiltration. The nodes are filled with the carcinomatous new growth and very little lymphoid tissue remains.

In the opinion of the writer, the best explanation of the con-



CASE IV.—Epithelioma arising in a mixed tumor of the parotid gland.

dition is that the patient had since childhood a tumor of the endothelial morphology, and that the recent rapid growth is the result of the carcinomatous change which has taken place in the epithelial cells of the so-called endothelial new growth. That the carcinoma is not derived from the parotid seems probable, for the gland is not extensively invaded, as it would be if the carcinoma were primary. Landsteiner describes a similar case in which malignant changes had taken place in a chondromatous tumor of the submaxillary gland, with the formation of growths of an epitheliomatous character which had broken through the tumor capsule and infiltrated the surrounding tissues. The regional lymph nodes were not invaded, in which point the case differs from the above.

CASE V.—St. Luke's, No. 1906. The patient was a male, aged forty-four years; has always been well and strong. Six years before admission to the hospital he first noticed a swelling of the right cheek just above and anterior to the parotid gland. The tumor was freely movable in a vertical direction, but not laterally. It was not painful and was soft, feeling a good deal like a sebaceous cyst. The skin and mucous membrane of the cheek are not adherent to the growth. The removal of the tumor was carried out without difficulty, the growth being encapsulated and not involving any of the deeper tissues.

On removal it was found to be roughly oval, measuring five by four by five centimetres. The surface was covered with small nodules about five millimetres high. The cut section was uniformly opaque and of a dull yellow and white color. No cartilaginous areas could be made out.

Microscopical examination of the tumor shows a growth composed of dense fibrous tissue with only a small amount of parenchymal substance. The fibrous tissue is rather cellular in a few places, the cells being fusiform, with large oval nuclei and resembling the fibroblasts seen in granulation tissue. Scattered irregularly through the fibrous tissue are many open spaces lined in general with a single layer of flattened cells which stain deeply with eosin, much as is seen in cornified epithelium. The contents of all of these alveoli have not been preserved in Zenker preparation or in specimens hardened in alcohol and formalin, though hyaline masses are present in a few. Evidently the fluid was of a serous nature and contained but little solid matter. Some of

the spaces, however, can be explained by the fact that the cells which originally filled them have fallen out during the manipulation of the sections, for solid masses of cells resembling cornified epithelium are present in parts of the tumor. Some of these areas are quite extensive, and spine cells with epithelial fibrillations can be easily made out by suitable staining and the use of high powers. The central spaces of other of the alveoli are filled with large flat cells with faint nuclei and poorly staining cell bodies, which are much like the large flat epithelial cells seen in the alveoli of mammary adenomata in which the milk-ducts have been occluded by the tumor growth. It is evident that a considerable proportion of the parenchymal cells are of epithelial origin, though the morphology of the tumor is that described as endothelial. No recurrence in a year.

CASE VI.—The specimen was removed from a female seventy years of age. She had noticed a tumor on the inner surface of the left cheek, near the opening of Steno's duct, for at least twenty years. It was oval, movable, and quite painless. The mass had increased in size very slowly. The tumor was easily shelled out and measured about two by one and one-half centimetres. It was smoothly encapsulated and the surface was lobular. On cross section the texture was fine and the surface a yellowish white. A few scattered islands of cartilage, none over three millimetres in diameter, could be recognized by their transparency. Microscopically, the growth consisted chiefly of cartilage, soft embryonic connective tissue with spider cells, and abundant mucous degeneration, typical endothelial strands and alveoli, and, finally, well-formed epithelial pearls. The cartilage is of the hyaline variety and contains a good deal of elastic tissue. The cartilage passes imperceptibly into either the soft connective tissue or the closely packed cells of the anastomosing endothelial strands. Indeed, there are no sharp boundaries between the various tissues of the tumor. The connective tissue in the centre of the growth is very soft and contains but few cells, and these send out long fibrillæ which join with those from other cells and form a network, in the meshes of which is found the mucous substance staining deep blue with hæmatoxylin. In this tissue are seen occasional spherical cells with one or two nuclei. They exactly resemble the cells of hyaline cartilage. Epithelial masses are also present in the mucous tissue. They have no connection with the

surrounding structure, but lie isolated as small spherical groups of flattened cells. The so-called endothelial strands and alveoli possess the morphology common to these structures. (Plate II, Fig. 1.) The alveoli are filled with hyaline masses. In other portions of the tumor the fibrous tissue is more dense though still very cellular. The epithelial pearls are found chiefly in these areas. The pearls are either quite distinct from the so-called endothelial portions of the growth, or they lie in the course of one of the long branching alveoli of endothelial cells, or they can be seen lying in the solid strands of the endothelial cells. Finally, the epithelial cells may be seen lining the walls of small cavities in the tumor. A few cells in all these masses when stained by Kromayer's method and examined in glycerin or even in balsam show intracellular bridges and the fibrillations characteristic of epithelial cells. Only a certain number of cells show this morphology, and they are chiefly the cells which take on a deep eosin stain. The cells of the so-called endothelial type do not show any such structures. (Plate I, Figs. 1 and 2; Plate V, Figs. 1 and 2.)

CASE VII.—St. Luke's, No. 1592. The tumor was removed from a female aged fifty-six years. Three years before her admission to the hospital she noted a small nodule in left parotid region. For two years there was no increase in size, but of late the patient thinks there has been a slow but steady increase in the size of the tumor. Health perfectly good at present. The tumor measures after removal about two by three centimetres. It is lobulated and surrounded by a thin capsule. It is soft in texture, and there are a few areas of softening. Microscopically the tumor is very cellular, with the strands of cells separated from each other by a delicate fibrous stroma which has undergone hyaline degeneration, especially along the blood-vessels, which are moderately abundant. Some of the strands contain alveoli filled with hyaline material. No cartilage is present, nor definite epithelial structures, but an abundance of elastic tissue. No recurrence after a year.

CASE VIII.—St. Luke's, No. 522. Tumor was removed from the left submaxillary region of a woman of forty-seven years. She had noticed the growth for eleven years. It was removed, and about three months after the operation she noted a recurrence, which has grown slowly for two years and for the past month quite rapidly. It is now about two centimetres in diameter and

causes pain and difficulty in swallowing. The tumor is but slightly movable and has no sharp outline. The patient's condition is good. The tumor when removed was found not to be encapsulated and measures roughly some two centimetres in diameter. It is embedded in a mass of fat, into which it merges imperceptibly. The cut section is rather soft and translucent, without any marked macroscopic characteristics.

Microscopically the growth is composed of alveoli in a connective-tissue stroma. The centre of each alveolus is filled with mucus; the periphery lined with flattened cells. No cartilage, and but very little elastic tissue is present in the recurrence, though it is usually very abundant in the primary growths of this group of tumors. The elastic tissue in a recurrent mixed tumor appears to be practically all derived from that pre-existing in the connective or other tissue invaded by the growth.

CASE IX.—St. Luke's, No. 1131. Male, forty-five years of age. A year previous to operation had noticed a small lump size of a marble just behind and below angle of right inferior maxilla. The mass was not tender or inflamed. Soon after the growth began to affect the patient's speech, and gradually the tumor was noticed to protrude more and more into the pharynx. For the past six months growth has been rapid. The tumor at present is the size of an orange, but is freely movable, and does not interfere with the motions of the lower jaw. No recurrence after two years.

Macroscopical examination of the growth shows it to measure eight by seven by six centimetres, the shape being roughly oval. The surface is slightly lobular. The consistency is firm and elastic in general, but there are harder and softer areas. On section the tumor is seen to be composed largely of cartilage lying in a soft fibrous matrix and containing a few small cysts. The whole is surrounded by a thin even capsule not over a few millimetres in thickness. The cartilage is of the hyaline variety and is quite transparent and of a bluish tint. The cellular portions of the tumor are opaque and yellow.

Microscopical examination of the growth shows that it is made up very largely of hyaline cartilage containing in different portions a variable number of cells. The cells have the morphology of those seen in normal cartilage. About the edges of the cartilaginous masses the cells are more abundant and lose their characteristic shape. They are often spindle-shape or even epithe-



CASE IX.—Large tumor containing cartilage chiefly.

lioid in form, and are arranged in long branching strands and spherical alveoli forming the so-called endothelial structure. The alveoli are filled with hyaline masses. Elastic tissue is not very abundant in the tumor as a whole, but in some portions of the cartilage there is a fine diffuse net-work of very fine fibres. In the cellular portions the strands are coarser and outline the alveoli.

CASE X.—The tumor is a recurrent parotid tumor from a male of about fifty years. The original growth was a small tumor of the left parotid about the size of an English walnut. It was reported as a mixed tumor. One year later there was a considerable diffuse local recurrence over the parotid region which was excised. The recurrence penetrated between the lobules of the parotid and could be distinguished from it by the yellow color of the tumor. The whole mass was removed, and no recurrence has taken place at the end of three years. The material removed was of the endothelial type with anastomosing strands of flat cells forming alveoli containing hyaline material. No cartilage was present; no epithelial pearls; no large amount of elastic tissue.

CASE XI.—St. Luke's, No. 411. The tumor was removed from a female aged twenty-six years. Five years previous to the operation a tumor the size of a pea appeared in the right parotid region; has grown slowly to the size of an English walnut. None of the lymph nodes of the neck are swollen. When removed, the tumor measured two and one-half by three by two centimetres. It is a flattened, encapsulated mass with a broad, irregular base. A small additional fragment is attached to the main mass by a pedicle.

Microscopically the tumor is chiefly made up of a soft cellular fibrous tissue with many nuclei and marked mucous and hyaline degeneration, the latter confined to the walls of the blood-vessels. Scattered unevenly through the whole are a few alveoli lined with flattened cells. A few of the alveoli contain hyaline material. No pearls or well-marked epithelial alveoli present. No recurrence in four years.

CASE XII.—St. Luke's, No. 630. The tumor was removed from a female fifty-six years of age. Five and a half years before admission to hospital she noticed a tender spot on side of neck with a small lump. There was some pain in tumor. The growth has been very slow and gradual. The tumor is hard and lobular with a smooth surface. It lies below the angle of the jaw on the right side and is the size of a hen's egg. Skin is movable over tumor,

and the latter is movable on the deeper tissues. The tumor was easily enucleated, except for one point which was adherent to the digastric muscle. It measures after removal five by three by two and one-half centimetres. The surface is lobular but smoothly encapsulated, except for the area which was adherent to the digastric. On section the periphery of the growth is firm and very cellular; the centre, however, has softened, and there is a ragged cavity from which the degenerated tissue has escaped. No areas of cartilage can be seen.

Microscopically the growth is very cellular, the cells being arranged in tubules and long strands. The cellular areas in places have been distended by collections of mucus forming a single cyst, or the mucus may have collected in a large number of separate areas forming a large number of cysts with cellular walls, the whole walled about with trabeculae of soft connective tissue. The general type of the growth corresponds to what has been called cylindroma. (Plate IV, Fig. 2.)

Though blood-vessels are not numerous, there are many extravasations of blood in the tumor, probably the result of the operative handling of the soft tumor. No cartilage and no pearls are to be seen. Elastic tissue abundant.

CASE XIII.—Recurrence of the above in about a year. The recurrence is local and in the form of a diffuse infiltration of the tissues with cells of the same type as before described: that is, flat or oval epithelial-like cells arranged in alveoli with a mass of mucous secretion in the centre. In many years the alveoli are not developed perfectly, and the cells have penetrated the tissues in long strands and masses of small cells retaining the morphology of the original tumor. No further recurrence after two years has been noticed since the thorough removal of this recurrence. The regional lymph nodes are not invaded. Very little elastic tissue in the recurrence.

CASE XIV.—St. Luke's, No. 659. Parotid tumor removed from a male aged thirty-three years. Eleven years ago first noticed a lump about the size of a small nut, one and one-half centimetres in diameter. It increased very slowly in size and was extirpated eight years ago. After this there was some induration of the scar, but nothing was seen until two years ago, when a small recurrence was noticed, slowly increasing to present size. There is no pain nor tenderness. No swelling of the neighboring lymph nodes.

The tumor occupies the right parotid region. It is adherent to the deeper tissues and to the skin. Its consistency is hard; it is quite lobular. The form is irregularly oval, somewhat larger below than above, and flattened from before backward. There is no distinct, smooth capsule, but the tumor substance proper is embedded in dense fibrous tissue, and does not ramify among the surrounding tissues. On section it is quite tough and firm, with harder and softer areas. The soft areas are quite translucent and resemble cartilage. The wound did not heal primarily, but showed a low grade infection with a corresponding rise of temperature up to 102.5° F.

The microscopical examination shows the tumor to be of a very variable structure. The whole growth is divided into lobules by connective-tissue bands, which are rather dense and contain a few spindle cells. Inside of these lobules are the following structures: (a) In some of the lobules the centre is made up of very fine mucous tissue containing only a few branching cells. These are the transparent areas resembling cartilage. (b) Areas with some mucous tissue, but in addition ramifying strands of spindle and oval cells. (c) Other lobules are filled with closely packed cellular masses resembling sarcoma, except that there is little or no connective tissue between the cells. (d) Areas which bear a strong resemblance to atrophied parotid gland with a few excretory ducts lined with cylindrical epithelium scattered through the mass of alveoli. Some of these alveoli contain hyaline material. No cartilage is found in the tumor and no pearls, but epithelial tubules lined with cylindrical epithelium are abundant, as is elastic tissue. (Plate VII, Fig. 1, and Plate I, Fig. 2.)

CASE XV.—St. Luke's, No. 1055. Tumor removed from parotid region of a female aged forty-eight years. Nine years before the patient's admission to the hospital she noticed a small nodule behind the lobe of the left ear, which gradually increased in size for five years and then began to grow more rapidly. The tumor is now about the size of a small orange. No pain, no general symptoms, no loss of flesh have been noticed. The tumor feels somewhat elastic when palpated and is slightly movable in all directions. It lies just below the lobe of the left ear and has pushed the lobe upward by its growth. At operation, the tumor was easily shelled out from the tissues of the neck. No enlarged lymph nodes were found. The tumor when removed was an

irregularly oval mass with lobular surface and a capsule. Its dimensions were about four by five centimetres. On cross section the tissue is firm, not cystic, and contains no cartilage. In the clear, transparent stroma can be seen the opaque, yellowish areas of the cells of the parenchyma. The microscopical examination shows the growth to be composed of tubular acini lined with large round and oval cells. The lumen of the alveoli contain hyaline masses staining red with eosin and yellow with acid fuchsin. The stroma is not very cellular and shows advanced mucous degeneration. No cartilage and no true pearls can be found. Elastic tissue fairly abundant. No recurrence in two years.

CASE XVI.—College, No. 6314. The tumor was removed from the parotid region of a male fifty-seven years of age. One year before operation he noticed a small nodule the size of a pea in front of the left ear. The mass is now the size of a hen's egg. It is movable under the skin and on the deeper tissues and the jaw. In some portions of the growth the consistence is soft and fluctuating; in others, hard. The tumor was shelled out of the substance of the parotid gland without difficulty. It contained a cyst of considerable size. Microscopically the tumor shows a diffuse growth of oval and spindle cells arranged to form alveoli. These alveoli and branching strands of cells lie in a dense connective-tissue stroma. No cartilage is present and no epithelial structures. Tumor recurred locally in six months. No recurrence after second removal. The mass removed at the second operation includes portions of the muscles of the face and neck and lymph nodes from the anterior triangle. The morphology of the recurrence is different from that of the primary growth. It resembles angiosarcoma in the fact that the cellular masses surround the blood-vessels. There are, however, portions of the growth in which the alveolar arrangement is preserved with long branching strands of cells lying in the tissue spaces. The lymph nodes show chronic hyperplasia, but no invasion by the cells of the tumor.

CASE XVII.—St. Luke's, No. 918. Parotid tumor. The patient was a man aged fifty-five years, who had always enjoyed good health, with the exception that five years previous to his admission to the hospital he noticed a slight swelling on the left cheek above and anterior to the parotid. At that time it was about the size of a bean. Growth has been slow except for the past year, during which the increase has been rapid. At present it is about

the size of a walnut and very hard. It is adherent to the skin, but movable over the deeper tissues. Tumor was easily removed at operation, and was found to lie upon the anterior border of the parotid gland. When hardened, the growth measures four by three by three and one-half centimetres. It is slightly lobular, and the cut section is pale and shows a large amount of fibrous tissue. Microscopically the growth contains a large amount of fibrous tissue, which is dense and contains only a very small amount of hyaline degeneration. The parenchyma is of a distinctly adenomatous type with papillary outgrowths into the alveoli. The papillary projections and the alveoli are lined with high cylindrical epithelium, and the lumina are filled with mucus staining blue. In some areas the alveoli are closely filled with cells. At the periphery of the tumor the cells form long strands lining the lymph spaces and resemble closely the so-called endothelial type. No cartilage is present and no epithelial pearls. The tumor would be classed as an adenoma from a morphological stand-point, and yet certain portions are of the same appearance as is seen in the endothelial tumors. No recurrence.

CASE XVIII.—College, No. 1399. The tumor was removed from a woman about forty-five years of age. One year previous some enlarged nodes had been removed from the neck just below the ear and behind (?) the sternomastoid muscle. They were considered by the operator to be tuberculous, but no examination was made. One year later there was a recurrence at the same place, and a more thorough excision was carried out. The material consists of a few fragments of a tumor which measured about two centimetres in diameter. There is a distinct capsule on portions of the fragments. Microscopic examination shows the growth to be of a cylindromatous type, with alveoli filled with mucus and surrounded by a connective-tissue stroma very poor in cells. (Plate IV, Fig. 1.) No recurrence after three years.

CASE XIX.—College, No. 5673. The tumor was removed from a male aged sixty years. It has been present in the side of the neck just below inferior maxilla for five years, increasing slowly in size. Specimen is a small, roughly spherical, lobulated tumor, about 2.5 centimetres in diameter. The section of the fresh tumor shows it to be enclosed in a rough fibrous capsule from two to five millimetres thick. There is no evidence that the growth has extended beyond the capsule into the surrounding tissues. The

cut section is pale, irregularly lobular, and the tissue has much the same consistence and elasticity as cartilage, though it is not translucent. There are a few small hemorrhages into the centre of the tumor, but no necrosis or softening.

Microscopically the growth is composed of a rather dense fibrous stroma, in which are seen larger and smaller areas of large flat cells of an epithelioid type. These cells have large oval nuclei with a well-marked chromatin net-work. They lie in close contact with the smaller blood-vessels and capillaries, and the general alveolar arrangement is determined by this relationship. No connective tissue can be made out between the cells and the elastic tissue fibrillæ, which are rather scant in the tumor, only surround the cell areas, and lie along the vessels, but do not penetrate between the cells as in so many of the mixed tumors. (Plate III, Fig. 3.) No spine cells or pearls are present, no cartilage, embryonic, connective, or lymphoid tissue.

This tumor, which was originally considered as a primary endothelioma of a lymph node, seems more properly defined as a sarcoma of the alveolar type despite the fact that there is no connective tissue between the cells. Ribbert has called attention to the fact that connective tissue is missing between the cells of a considerable number of the sarcomata, especially in the group of angiosarcomata with large cells. The reasons for considering the tumor as arising in a lymph node are based solely upon the opinion of the operator who removed the growth; under such conditions any small spherical tumor is liable to be classed as a lymph node. It is true that the morphology of the growth slightly resembles the endothelial hyperplasias of the spleen recently described by Bovaird, Grancher, and others, but the numerous mitotic figures which are present in the growth under consideration—four or five often being visible in a single field—would point rather to a rapidly growing malignant tumor than to a chronic hyperplasia as in the splenic tumors mentioned above. The absence of any embryonic tissues and cartilage certainly renders doubtful the possibility of the tumor being of congenital origin. No recurrence is recorded, though two years have elapsed since the operation.

A few cases similar to this tumor have been described (Puttata, Böttcher, Chambard, Zahn, Hoffman, Volkmann), but their morphology is not easily determined from the descriptions given. Ziegler figures a similar tumor in his text-book.

CASE XX.—College, No. 273. Mixed tumor of the pharynx. No history is recorded except that the growth was a very large one, filling the cavity of the pharynx so that the point of origin could not be determined. The mass when removed was irregular in shape and measured about seven by five by four centimetres. The consistence of the tumor was soft, and areas of mucous tissue could be distinguished by their transparent appearance. Microscopical examination of the growth reveals three groups of tissues,—connective tissue with advanced mucous degeneration; fat tissue; and soft connective tissue in which lie branching strands of large flat and polygonal cells. The centres of some of the strands contain hyaline material staining red with eosin. Elastic tissue and mucous degeneration abundantly present in all portions of the tumor. The arrangement of the large epithelial-like cells is of especial interest and will be considered in detail.

The walls of the long tube-like alveoli are lined with two distinct layers of cells (Plate II, Fig. 2),—one, the small, flat endothelial-like cells with deeply staining nuclei and small cell bodies such as are seen lining the tissue lymph spaces and smaller vessels; the other cells are large epithelial-like cells with large pale nuclei and a well-marked nuclear net-work. These cells form a single layer over the above-mentioned endothelial cells and are not very firmly adherent to them, for in the process of hardening a long strand of these cells can frequently be noticed to have become detached from the underlying layer of endothelium. (Plate II, Fig. 2.) Two interpretations are possible; first, that the cells are produced by a new growth of the underlying layer of endothelium; and, second, that they are tumor cells which have grown into the lymph spaces and more or less completely filled them, just as one can easily observe in the periphery of a lymph node during the early stage of the invasion by a carcinoma. (Plate III, Fig. 1.) The cells of the carcinoma may be seen in the lymph spaces as a single layer of cells lying on the normal endothelium lining.

The first explanation is that given by Volkmann and those who believe in the endothelial origin of the large flat cells of these tumors. The second point of view has two facts to support it; one is that when the endothelial cells proliferate, as can be seen in various places along the wall of the alveoli, they form masses of small cells with the same deeply staining nuclei as can be seen

lining normal lymph spaces, and these masses thrust aside the large flat cells and form small protrusions into the lumen of the alveolus. (Plate III, Fig. 2.) The second fact is that alveoli are found which can be traced for some distance as tubes lined with cells and then end in a small compact mass with closely packed, concentrically arranged cells which resemble epithelial pearls and contain spine cells. According to the second idea, then, the large flat cells are probably epithelial in origin and spread out through the tissues along preformed lymph spaces, leaving the normal endothelial lining intact. Taking the tumor as a whole, the cellular portion forms but a small part of the growth, the alveoli and pearls are scattered throughout a very abundant mucous and fibrous tissue which often contains fat cells. The growth is to be interpreted, in the opinion of the writer, as a tumor arising from a congenital remnant left during the formation of the pharyngeal space, and containing epithelial cells which were destined to form glands, but the normal differentiation did not take place, and the epithelium still retained an indifferent type, with a tendency to revert to the type of squamous epithelium such as lines the pharynx.

CASE XXI.—College, No. 2136. Tumor of the vault of pharynx. The growth was removed from a male aged sixty-five years. The tumor had been noticed for a year, gave few symptoms, and was the size of a hen's egg. It was removed by wire snare. The tumor is made up of anastomosing strands of cells which lie in a loose stroma. This distribution of the cells gives the section a reticulated appearance. In other portions of the growth the cells are crowded together in larger and smaller alveoli. The centres of these cell masses are degenerated, contain mucin and hyaline material. The connective tissue is also the site of hyaline degeneration. No record of recurrence. No cartilage; no epithelial pearls.

CASE XXII.—College, No. 2079. The tumor was removed from a female thirty years of age. It was encapsulated and oval in form, measuring four by three by three centimetres. It had been present in the soft palate for two years. The cross-section of the growth shows a fine, even surface, with a few trabeculae crossing it and small cartilaginous areas scattered through of irregular size; the largest, perhaps, three millimetres.

Microscopically the tumor is composed of a diffuse cellular

growth of spindle and flat cells with but little connective tissue. The cells show but little alveolar arrangement, but in a few places there are distinct alveoli with high cylindrical epithelium lining the walls. The cartilage is in small amount and contains a good deal of elastic tissue. No epithelial pearls.

CASE XXIII.—College, No. 7315. The tumor was removed from a female twenty-six years old. It was situated on the roof of the mouth near the median line and just in front of the folds of the soft palate. The size is roughly two by two by one centimetre. The surface is smooth and slightly lobular. The morphology is endothelial in type, with rather abundant cells and only a moderate amount of stroma. No cartilage, but abundant and elastic tissue.

CASE XXIV.—College, No. 10,042. Recurrence in a year. Tumor had been noticed by the patient for only ten days before its second removal, so that the growth must have been slow. Its dimensions are two by two by five centimetres. Sections show the same morphology as before. The strands of cell masses have invaded some of the mucous glands of the soft palate and have produced a very curious picture; the tumor cells forming alveoli which lie in close contact with those of the gland, and are at times difficult to distinguish from the latter, the resemblance is so close. No cartilage in the recurrence. Elastic tissue very abundant, outlining the tumor alveoli and forming a dense network throughout the whole growth, though there is less than in the primary.

CASE XXV.—The specimens were removed from a woman about forty-five years of age, who had had a submaxillary new growth in the side of the neck some twenty years before. This was imperfectly removed, and numerous recurrences have taken place which have necessitated operative interference almost every year since. The growth still remains confined to the lateral aspect of the neck, and the general condition of the woman is good. The specimens under consideration represent the last three removals. The numerous fragments show traces of a capsule surrounding them and on cross section a uniform pale cellular surface. The microscopic picture varies somewhat in the earlier and later recurrences. In the earlier ones the type is still distinctly that which has been considered endothelial with anastomosing strands of cells lying in a connective-tissue stroma.

The later recurrences have lost their characteristic morphology and resemble to a certain extent the true sarcomata with flattened cells. There still remains, however, something in the aspect of these sections under the microscope that is suggestive to any one who has seen a number of the mixed tumors, something in the shape and even staining of the cell nuclei and the arrangement of the cells that differs from the ordinary picture of sarcoma. A few spindle-shaped connective-tissue cells lie between the masses of tumor cells, and these have been stained and figured by a number of observers, notably Barth, as an evidence of connective tissue between the cells of the mixed tumors. The case is chiefly interesting because of the large number of recurrences and the comparatively benign character of the growth. No involvement of the cervical lymph nodes has taken place. (Plate VI, Figs. 1, 2, and 3.)

CASE XXVI.—Old No. 1598. The patient was a male aged forty-four years, who had a small nodule on the upper lip for two years. The tumor was removed and recurred in two years. The tumor under consideration is this recurrence. It measures about one centimetre in diameter. It lies in the tissues of the lip near the surface, but covered by the superficial epithelium. The sebaceous glands near the surface are compressed and lie flattened out on the capsule of the tumor. The latter does not infiltrate the deeper tissues. It is composed of small nodules of mucous tissue and hyaline cartilage. The mucous-tissue areas contain branching strands of cells and alveoli. The latter are in general lined with flattened cells, but in a few areas the cells are high and cylindrical, with the nuclei near the basement membrane. The cartilage is hyaline. Elastic tissue is abundantly present in the tumor.

CASE XXVII.—College, No. 2009. The tumor is recorded as having been present for a number of years in the upper lip. It was neatly encapsulated, and was shelled out of its bed by incising the mucous membrane of the inner surface of the lip. The tumor as removed is about the size of a bean, oval in form, and smooth of surface. It contains no visible areas of cartilage. No record has been preserved of a recurrence. Microscopically the tumor is composed of anastomosing strands of cells in a soft cellular stroma, the latter containing areas of mucous degeneration. Large alveoli filled with hyaline material are present

in portions of the growth. No pearls or distinct epithelial structures are present. A moderate amount of elastic tissue is present.

CASE XXVIII.—College, No. 2411. Female aged thirty-four years. The tumor was first noticed when patient was thirty-two years of age. It was under the ramus of the jaw on the left side. Removed after six months' fairly rapid growth. Recurrence after ten months. Second recurrence after eight months. Third recurrence after six months, involving all the left parotid region and the deeper tissues of the neck. Fourth recurrence six months later. Lymph nodes not invaded. Only portions of the various tumors have been preserved. The microscopic morphology is the same in all. The parenchyma is composed of oval or spindle cells with an alveolar arrangement, the alveoli often containing hyaline masses. The stroma shows some mucous degeneration. In the later recurrences the alveolar arrangement is less marked, and at first glance the morphology is suggestive of sarcoma, but occasional areas still show traces of the alveolar types. No cartilage in the growth, and no epithelial structures.

CASE XXIX.—College, No. 6560. The tumor was removed from the left parotid region of a male aged thirty-one years. It had been present for four years. During the last year growth had been rapid. The tumor is now the size of a small orange, is elastic and movable on the deeper tissues and under the skin. Easily removed at operation by shelling out the encapsulated tumor from the parotid substance. Microscopically the growth consists chiefly of dense connective tissue containing a few spindle cells with marked hyaline degeneration of the stroma. In a few areas there are masses of spindle and stellate cells lying in soft connective tissue which has undergone mucous degeneration. Towards the periphery of the growth, close under the fibrous capsule, the morphology is that of the endothelial type, that is, alveoli and a few solid strands of cells. Alveoli contain hyaline masses. No pearls or flat epithelium are present in the tumor, but there are a few ducts lined with high cylindrical epithelium and containing masses of flat cells evidently derived from the degeneration of the lining epithelium. No cartilage is present and no lymphoid tissue, but there are a few areas of fat tissue. The tumor has not recurred in the two years since the operation.

CASE XXX.—College, No. 7479. The tumor was removed from the right side of the neck of a male patient aged sixty-five years. For two years a mass had been noticed protruding into the pharynx just in front of tonsil. It has slowly grown during that time, and now projects more externally than internally, and at about the angle of the jaw. The tumor was movable in the deeper tissues and of oval form, about the size of a hen's egg. When removed, the growth was found to be a lobular encapsulated mass with an area of softening in the centre. Sections of the growth show it to be a typical tumor of the endothelial type with a great deal of mucous degeneration of the connective-tissue stroma. No cartilage or epithelial structures can be found and no lymphoid tissue. The absence of the lymphoid tissue shows that this tumor is not derived from one of the branchial clefts, though its softened centre and position were suggestive. No recurrence of the growth in two years.

CASE XXXI.—College, No. 2141. Submaxillary tumor. The tumor was removed from a female aged forty-five years. The tumor was first noticed as a growth under the body of the left inferior maxilla some nine years before. The growth was slow. The tumor measures three by four by three centimetres. Attached to it is a large mass of the submaxillary gland. It is partially encapsulated. Microscopically the growth is an exquisite example of what has been designated cylindroma. The tumor is composed of alveoli, which may be either solid or partially distended with mucus or wholly distended, so that the cells form a flattened ring at the periphery. The most frequent condition is, however, a partial distention, with many small spherical areas of mucus in each alveolus. This gives the tumor its peculiar morphology. (Plate VII, Fig. 2.) No cartilage or definite epithelial structures are present. The submaxillary gland has been invaded by the tumor, and the compressed alveoli of the gland are with difficulty distinguished from the alveoli of the tumor. The tumor recurred locally in two years, but after a second removal there has been no recurrence in three and a half years.

CASE XXXII.—College, No. 9565. Tumor from submaxillary region. The growth is hard, lobular, and roughly spherical. Its greatest diameter is about four centimetres. Cross section is pale, smooth, and rather homogeneous. The capsule is very thin. No remnants of submaxillary tissue present. No macroscopic

areas of cartilage. Microscopically small masses of cartilage are fairly abundant, and also a good deal of myxomatous connective tissue. The main portion of the tumor follows the conventional endothelial type, but scattered throughout the whole growth are a considerable number of epithelial pearls. These are either quite discrete or are in intimate connection with the tubules and strands of the endothelial portions. Spine cells can be seen in a few of the pearls, especially those in the myxomatous tissue (Plate IV, Fig. 1.) Elastic tissue is very abundant. No recurrence in six months. This case resembles the one described by Wilms, in which he showed that epithelial structures are not confined to the parotid group of tumors as Hinsberg had thought. This observation renders doubtful Hinsberg's supposition that the epithelial structures might be derived from the epithelial anlagen destined to form the ear-drum.

CASE XXXIII.—No record is preserved of this tumor, the fragments of which are in the collection of the Department of Pathology, College of Physicians and Surgeons. The label records only that the tumor is a mixed enchondroma of the parotid. Sections from the fragments of tumor which remain show that the growth is in the main of an alveolar type with scattered areas of cartilage and mucous degeneration. The alveoli are lined with flat cells and contain masses of hyaline material. In several places in the sections well-formed pearls can be seen with epithelial spine cells. Elastic tissue is very abundant throughout the growth, especially about the alveoli.

CASE XXXIV.—V. C. 9. Tumor of parotid. No history is recorded of this specimen. The material consists of a few blocks of tissue evidently from a tumor of six or eight centimetres in diameter. Some of the fragments show a distinct capsule. Microscopically the tumor is divided by trabeculæ into alveoli of irregular size. These alveoli are lined and filled by a cellular mass which also forms alveoli. These smaller alveoli are often surrounded by a single layer of cells and contain masses of mucus which stain deep blue with hæmatoxylin. No cartilage is present and no great amount of elastic tissue. At one side of the growth is a remnant of much compressed parotid gland, but no invasion of the gland tissue by the tumor has occurred. (Plate VII, Fig. 3.)

CASE XXXV.—The tumor was removed from the outer surface of the lower lip of a male patient of thirty-three years. The

growth was oval in form and measured two by one and one-half by one and one-half centimetres. It had been noticed as a small mass about the size of a pea since childhood, and had grown slowly ever since. The only discomfort noticeable was due to the mechanical interference with swallowing and speaking. An ulcerated surface had been noticed for the past month on the most prominent portion of the tumor. The tumor was movable in the tissues of the lip but quite closely adherent to the skin, so that it was impossible to shell out the growth. Microscopic examination of the tumor shows it to be of the endothelial type with a large amount of mucous degeneration of the connective-tissue stroma. Very few alveoli are to be seen, the cells lying, as a rule, in anastomosing strands embedded in the mucous tissue. There is no cartilage present and no epithelial structures. Elastic tissue is very abundant. About the periphery of the growth, but external to the capsule, are many mucous glands, in some of which the alveoli have become atrophied by pressure, in others are still normal. The tumor has not recurred in six years.

CASE XXXVI.—Old Nos. 232, 241, 242. The material consists of a tumor from the parotid region with the fragments removed from a series of five recurrences, extending over some five years' time. There is no other history connected with the specimens. The primary growth is of the conventional endothelial type with abundant strands of cells occasionally forming alveoli which are filled with hyaline material. No cartilage is present, and only a moderate amount of elastic tissue. The various recurrences are of interest only as they show the gradual tendency of the growth to assume a sarcomatous type with only occasional suggestions of the alveolar structure of the original. In the last recurrence, however, the morphology is quite markedly alveolar, though not quite as evident as in the original. The case is of interest only to illustrate the possibilities of frequent local recurrences without involvement of the internal organs or the neighboring lymph nodes.

CASE XXXVII.—Old No. 465. The tumor was removed from a male thirty-eight years of age. He had had a small parotid tumor for fifteen years. For the last six months the tumor has grown rapidly and is now of oval form, measuring six by four by four centimetres. There is a thick, rough, fibrous capsule which surrounds the periphery of the tumor, and a mass of the

parotid gland is embedded on the internal surface of the growth. The cut surface is divided by trabeculae with numerous lobules measuring from five to fifteen millimetres in diameter. No cartilage can be seen. Microscopically the tumor is cellular and follows generally the cylindromatous type, though a few areas are composed of solid masses of cells. Very little fat is present in the tumor and but little mucous or hyaline degeneration. Elastic tissue is also scarce. The parotid is normal. No pearls or epithelial structures are to be seen.

CASE XXXVIII.—The tumor was from a male of about thirty years of age, and had been present on the inner aspect of the upper lip in the median line for many years. It was easily shelled out by incising the mucous membrane over it. When removed it was an encapsulated mass of oval form with a diameter of eight millimetres. Sections show the tumor to be composed of branching strands of oval cells in a stroma of soft connective tissue with much mucous degeneration. No epithelial structures, no cartilage, but a good deal of elastic tissue is present.

CASE XXXIX.—Old No. 573. An adenoma of the parotid gland. No history has been preserved of the tumor and the entire specimen consists of four fragments each about two centimetres square and five millimetres thick. The microscopical appearance of the growth is that of a true adenoma or adenocarcinoma of the parotid. It is composed of a dense fibrous stroma, the trabeculae of which outline areas of cell alveoli. These alveoli are lined with one or two layers of cylindrical cells with large oval nuclei and a well-marked chromatin net-work, differing in this latter detail from the so-called endothelial cells. The alveoli, as a rule, contain no secretion. Remains of the ducts of the parotid are scattered through the tumor, and at one portion of the section normal parotid gland tissue can be found in close contact with the tumor cells. Another portion of the tumor shows the morphology of what has been called the endothelial type. There are long tubular alveoli lined with flattened cells; smaller alveoli containing hyaline secretion, and also alveoli containing double rows of lining cells such as have been figured in Plate II, Fig. 2. No cartilage and no pearls are to be found. Elastic tissue is fairly abundant. The case is reported here merely to show that morphology counts for little in the final decision as to the histogenesis of the cells of the salivary tumors, because in a growth evidently epithe-

lial in nature, areas can be found in which the morphology alone would lead one to consider the tumor as endothelial, just as in many cases of the small congenital epithelial tumors of the skin a cylindromatous arrangement of the tumor cells is not infrequent.

CASE XL.—Old No. 639. The tumor is from a woman aged fifty-eight years. Eighteen years before the present operation, a small growth over the parotid was removed by the action of caustic. The tumor has been growing ever since. The growth is of oval form with the inner surface flattened, and measures eight by seven by five centimetres. It is encapsulated on its outer surface and somewhat lobular. The inner aspect is rough from the severing of adhesions to the deeper tissues. The cut section is fine in texture and pale with transparent areas of mucous tissue and cartilage. There are a few hæmorrhages into the substance of the growth. No well-marked trabeculæ are present. Microscopically the growth is of the cylindromatous type with few cysts. The fibrous tissue is rather dense and the cells few and spindle in form. A few areas of hyaline cartilage are to be seen, and in some places a large amount of mucous degeneration has taken place in the connective tissue. In one portion of the growth are a few alveoli lined with high cylindrical epithelium, but these are all confined to a limited area and are not generally found. There is also an area which resembles a cellular sarcoma with cells closely packed about the vessels. The tumor contains a moderate amount of fat and is abundantly supplied with elastic tissue. There is no history of a recurrence after removal.

CASE XLI.—St. Luke's, No. 696. Recurrence after removal of a parotid tumor. The patient was a male from whose parotid region a large mixed tumor had been removed six months before. No local recurrence was noticed after the operation, but the patient gave symptoms of pulmonary and other metastases. A small subcutaneous nodule was removed from the side and showed a large-celled sarcoma with a tendency to alveolar arrangement of the cells. No further record of the case has been obtainable. The morphology of the growth is like that of the following case.

CASE XLII.—St. Luke's, No. 1590. Recurrent sarcoma of parotid. The patient was a male twenty-eight years of age, who had had a tumor removed from the parotid region four months before. The original growth had been noticed as a small nodule for several years. Several months before its removal the growth



CASE XLII.—Recurrent sarcoma of parotid.

had become more rapid. No sections of the original tumor were obtainable, but the patient said the tumor had been hard and easily movable. The recurrence is a conical mass projecting from the surface of the left parotid gland. It is about four centimetres high and six centimetres in diameter at the base. The skin over the tumor is reddish, adherent, and the superficial veins are well marked. The growth is fixed to the parotid. On section, the tumor is firm, except for one area of softening, and contains no cartilage.

Microscopic examination of the growth showed it to be a large polyhedral celled sarcoma of the conventional type, with a more or less marked alveolar arrangement of the tumor cells. The only noteworthy features are the enormous number of mitotic figures present in the cells of the tumor and the slight amount of invasion of the parotid tissue. The parotid glandular tissue is atrophied in many places and replaced by connective tissue in which is a large amount of mucous degeneration. The morphology of the tumor is the same as in the recurrent Case XLI. The patient died from operation shock.

CASE XLIII.—Old No. 760. The specimen is a tumor of three years' duration, which is situated at the angle of the jaw superficial to the deep cervical fascia and quite movable under the skin and on the deeper tissues. It is oval, measuring about three by three by four centimetres, and smoothly encapsulated. The cut section shows a uniform pale cellular surface with small islands of hyaline cartilage scattered through it.

The microscopic examination of the growth shows it to be composed largely of a cartilaginous matrix in which lie numerous strands of cells and alveoli. The alveolar walls are lined in many places with high cylindrical epithelium, and a few areas are present in which faint intercellular bridges can be made out. No pearls are present. There is a very abundant elastic tissue network in the cartilage. The fibres also pass between the cell masses and form walls about the alveoli. This large amount of elastic tissue seems to be rather characteristic of these tumors, for Spuler has not found much elastica in the chondromata.

CASE XLIV.—Old No. 1400. Growth was removed from a male aged thirty years, after a slow growth of two years. The tumor was situated at the angle of the jaw, lying on the parotid gland. It measures after hardening four by five and one-half

by three and one-half centimetres. There is a fairly complete capsule over the various portions of the tumor, and this capsule sends off trabeculae which divide the tumor into a series of lobules resembling those seen in a section of the pancreas. Small areas of cartilage can be seen in one portion of the growth.

The microscopical examination shows the tumor to be of the ordinary morphology generally known as endothelial with alveoli filled with hyaline material and walled with flattened cells. There are also long branching strands of cells of an epithelial type which form a meshwork throughout the soft fibrous stroma. In places the solid strands form pearl-like structures with concentric layers of closely packed cells which stain strongly with eosin and show no nuclear structure. At the periphery of these pearls and in some of the strands of flat cells intracellular bridges and fibres can be made out. A small fragment of compressed parotid and some skin are to be seen in some of the sections. Neither tissue is invaded by the growth, but both lie outside the fibrous tissue capsule of the tumor. The tumor is evidently a mixed tumor containing both epiblastic and mesoblastic tissues. No record of patient's further condition.

CASE XLV.—Old No. 1679. The specimen was removed from a male of sixty-three years. The tumor had grown for a year from the surface of the superior maxilla. No other history is recorded. The material as preserved in the collection of the Pathological Department is composed of a number of irregular masses which altogether form a tumor the size of a small lemon. The skin is adherent to the external surface of the growth, but is not invaded by the cells of the neoplasm. The cut surface is smooth and of fine texture. No cartilage can be seen. A thin capsule surrounds the peripheral portions of the fragments. Microscopically the tumor contains three distinct structures,—a cylindromatous type of growth, a simple tubular endothelioma, and a form in which closely packed cell areas are surrounded by septa of connective tissue which have undergone hyaline degeneration. (Plate VIII, Fig. 1.) There is a moderate amount of elastic tissue present, but no cartilage and no epithelial structures.

CASE XLVI.—College of Physicians and Surgeons, Old Series No. 1727. The tumor was removed from the parotid region of a man aged fifty-seven years. No history has been recorded except that the tumor had been present for a number of years. The material which had been preserved consists of numer-

ous fragments which together measure some six by five by four centimetres. The outer surface of the tumor is covered with nodular elevations. The whole is surrounded by a fibrous tissue capsule. Portions of the parotid gland are adherent to the periphery of the growth. The cut section is opaque and uniform in appearance except for the presence of small areas of softening and hæmorrhage. No cartilage is visible. Microscopically the growth resembles a large-celled sarcoma, but at the peripheral portions of some of the cell masses an alveolar arrangement can be worked out. The alveoli are filled with mucus which takes a blue color with hæmatoxylin. There is no connective tissue between the individual cells. Elastic tissue is not abundant. No cartilage is present. No invasion of neighboring lymph nodes. The parotid gland is not involved. It is difficult to exactly class this tumor, for which the original diagnosis was adenosarcoma. Some observers might with perfect right insist that the morphology more closely resembles the sarcomatous type than that called endothelial. The vessels are more numerous than in the purely endothelial tumors, and in certain areas the cells are in very close relation to the vascular endothelium, giving an appearance such as is found in the angiosarcomata.

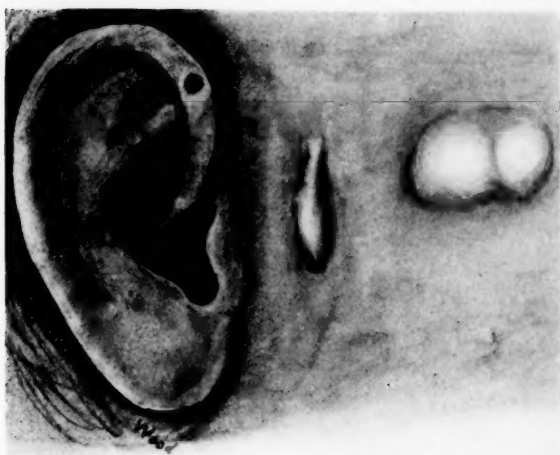
CASE XLVII.—Old No. 1728. The specimen is a tumor from the parotid region. No other record has been preserved. The material consists of a few blocks of tissue evidently removed from a large mass. Microscopically the growth is largely composed of myxomatous tissue with strands of cells lying in it. These cells form alveoli containing hyaline material. Small areas of cartilage are scattered throughout, not in the form of clean cut nodules, but rather in diffuse masses with large oval cells, shading off gradually into the myxomatous areas with spindle cells. The transition is very gradual, and it is often impossible to decide just where the point of separation occurs. In portions of the growth the stroma cells are arranged in well-formed alveoli with high cylindrical cells lining the walls. No pearls are present. Elastic tissue is very abundant.

CASE XLVIII.—Old No. 1844. The patient was a female fifty years old. Three and one-half years previous to operation a swelling appeared in front and below the right ear. The tumor has grown rapidly and is now of large size. It is slightly movable on the deeper parts. The skin is red and adherent. The

tumor is oval in form and measures thirteen by nine and a half centimetres. It is rather soft and elastic to palpation. Macroscopically the cut surface of the growth is of fine texture with numerous clear areas of mucous degeneration. There are faintly marked fibrous tissue trabeculae throughout the tumor, and it is surrounded on its outer aspect by a thin capsule. Microscopically the growth is composed chiefly of soft fibrous tissue, which is the site of advanced mucous degeneration and closely packed cells of spindle and oval form resembling sarcoma. In portions of the growth where the fibrous tissue is more dense, however, the cells are arranged in alveoli and strands as in the endothelial type. No pearls are to be found. Elastic tissue is abundant. No record of a recurrence.

CASE XLIX.—Old No. 1858. The tumor was removed from the submaxillary region of a male aged forty, after a slow growth of seven years. The tumor measures seven by five by five centimetres and weighs 110 grammes. It is encapsulated. The surface is lobular. Trabeculae run into the growth from the capsule and divide it into numerous secondary lobules which are filled with soft cellular masses cutting like cheese. The color of the cellular areas is pale, and there are numerous transparent spots due to mucous degeneration. Microscopically the growth varies a good deal in different portions. Some of the areas resemble an angiosarcoma, except that the cells do not lie in close contact with the vessels, but are separated from them by a thick vascular wall. In other areas the morphology is cylindromatous, with long anastomosing strands of cells separated from each other by connective tissue altered by advanced hyaline degeneration. In certain portions there is hyaline degeneration of the connective tissue with mucous degeneration of the cells bordering the degenerated connective tissue. The cells over large areas are replaced by mucous secretion. No definite epithelial structures can be found. Elastic tissue is abundant. No cartilage is present. The further history of the case is not known.

CASE L.—The tumor was removed from the left parotid region of a male of twenty-seven years. He had had a small movable tumor in this region since childhood. Growth has been very slow and constant since that time. The tumor measures about two centimetres in diameter, is easily movable in all directions, and is very hard. About two centimetres posterior to the



CASE L.—Sketch from a photograph of a patient with a parotid tumor and congenital malformations of the ear and face.

tumor is a small pedunculated growth which was congenital. It is roughly one centimetre long and one-half centimetre in diameter. The form is cylindrical and the surface is covered with fine hair. The growth is attached by a pedicle to the deep fascia. The ear also shows an auricular fistula, which was noticed at the time of birth. The tumor over the parotid is lobular and encapsulated; its cut section is white and close grained, with a few small islands of cartilage scattered irregularly throughout. Microscopically the tumor is of the conventional endothelial type with islands of cartilage and much mucous degeneration. There is nothing peculiar about the growth except that there are numerous pearls in the more cellular portions. These pearls are formed of masses of flattened cells with a central area in which no structure can be made out. At the periphery of the pearls the epithelial cells show characteristic fibrillations and intracellular bridges. Keratohyalin granules can be seen in a few cells. In the neighborhood of the pearl containing tissue are also a few cysts and branching tubules lined with a single layer of flat cells which stain deeply with eosin. These cells are of the same appearance as the epithelial cells forming the periphery of the pearls, and though no fibrillæ can be made out, they resemble in morphology the other epithelial cells in the sections. Elastic tissue is abundant in the tumor.

The small pedunculated mass posterior to the tumor contains a spur of fibro-elastic cartilage, and seems most easily explained as an accessory tragus. This assumption is rendered more probable by the presence of another congenital malformation, the auricular fistula. The case is of especial interest because of the connection of a tumor containing embryonal tissues with other congenital malformations of the facial region, as evidenced by the accessory tragus and auricular fistula. No recurrence has taken place in two years.

CASE LI.—Old No. 1959. Tumor removed from side of neck. No other history concerning the specimen has been recorded. The portions of the tumor which have been preserved are two flat sections measuring some three by five centimetres and one to five centimetres thick. The external surfaces are lobular and encapsulated. The cut surface is smooth and compact and contains scattered areas of cartilage. Microscopically the growth is of the endothelial type with strands and alveoli and cartilaginous

areas merging imperceptibly into the cellular masses. There is but little mucous degeneration. Well-formed pearls are present formed of flattened cells at the outer portions, and in the centre a mass of degenerated cells which stain red with eosin. In the peripheral portions of the pearls the cells can be seen to be connected by intercellular bridges, the fibres from which pass over into the cell bodies. The pearl-forming cells are in contact with those of the solid strands and alveoli of the endothelial type and continuous with the latter. The pearls do not occupy any limited area, but are scattered throughout the more cellular portions of the growth. Elastic tissue is very abundant in all portions of the growth.

CASE LII.—College, No. 2017. The tumor was removed from the parotid region of a female aged twenty-four years. The growth had been noticed for two years previous. The tumor is a lobular, roughly spherical mass, two centimetres in diameter. It is encapsulated. Microscopically the tumor is composed of branching strands of cells lying in a matrix of connective tissue, much of which has undergone mucous degeneration. No cartilage nor evident epithelial structures are present. Elastic tissue is moderately abundant. No recurrence.

CASE LIII.—College, No. 2397. The patient was a female fifty years of age. The tumor was situated in the parotid region and had been noticed for one year. The growth is a pear-shaped, encapsulated mass, measuring seven by six by four centimetres. It is surrounded by a dense fibrous capsule. Microscopically the growth is of a mixed type, showing solid masses of cells in certain areas and alveoli in others. Some of the alveoli are lined with high cylindrical epithelium. Elastic tissue is abundant. No invasion of the lymph nodes. No cartilage present; has not recurred.

CASE LIV.—No record is preserved of this tumor. The specimen is designated as a myxochondroma of the parotid. The tumor measures three by three by five centimetres and is encapsulated. Ragged fragments of the parotid gland are attached to the periphery of the growth together with portions of the masseter muscle. One pole of the oval tumor is firm and shows a smooth homogeneous cut surface. The other pole has softened and broken down to form an irregular cyst cavity. The capsule is some three millimetres thick and composed of dense fibrous tissue.

Microscopically the growth is largely composed of mucous tissue with many spider cells. Scattered through this tissue are long anastomosing strands of cells which occasionally form alveoli. Parotid tissue is compressed by the tumor and somewhat atrophied, but the tumor structures have not invaded the salivary gland. Small islands of cartilage are scattered through the growth and occasional epithelial pearls can be seen.

CASE LV.—The original tumor was removed from a man of fifty-five years of age. It was on the left side of the neck just under the body of the inferior maxilla. The growth had been noted for about two years. It was adherent to the deeper tissues and partly encapsulated. Microscopically it was an exceedingly cellular growth with branching strands of cells, some of which form alveoli with hyaline contents. No cartilage is present and no epithelial structures; elastic tissue is abundant. Recurrence in three months with invasion of the tissues of the neck and the periosteum of the inferior maxilla. The recurrence retains to a certain extent the alveolar arrangement of the primary growth, but is more diffuse and cellular, and invades the muscle and connective tissues of the neck. No invasion of the regional lymph nodes. The patient died a few months after the second operation.

CASE LVI.—The tumor is in the collection of the Pathological Department, labelled myxosarcoma of parotid. No other record has been preserved. The growth is an oval encapsulated mass measuring about seven by five by four centimetres. In the centre is a ragged cavity formed by necrosis of the tumor cells. The tumor is divided into large alveoli by trabeculae of connective tissue. The contents of the alveoli are translucent and soft. These areas are seen to be made up of mucous tissue when examined microscopically. In this mucous tissue lie strands of cells occasionally arranged to form alveoli which contain hyaline material. No cartilage or epithelial structures are present. Elastic tissue is very abundant.

CASE LVII.—St. Luke's, No. 1792. The tumor was removed from left submaxillary region of a young woman of twenty-eight years. She had noticed the tumor for four years, and thought that the growth had been very slow until three months before the operation. It is now the size of an English walnut, and is freely movable in the lax tissues of the neck. The tumor when removed and hardened measured three by three and one-half by two centi-

metres. The surface was smooth but slightly lobular, and the tumor was inclosed in a thin capsule. Cross-section of the growth shows a firm white mass without visible trabeculae. Microscopically the tumor is composed of interlacing strands of cells with an occasional dilatation forming an alveolus which is often filled with hyaline material. No cartilage and very little degeneration are present. No epithelial structures. No recurrence in six months.

CASE LVIII.—A small tumor removed from right submaxillary region of a woman of thirty years. No history was obtained, except that no recurrence has taken place in the two years since the operation. The tumor measures four by three by two centimetres. The surface is rough and covered with fragments of the submaxillary gland and fibrous tissue. On section the surface is very pale and translucent. Some of the more cellular areas are yellow and opaque from the fatty degeneration of the cells. There are a few small cysts, none over three millimetres in diameter. No cartilage is visible. Microscopically the growth is of the ordinary endothelial type, with no peculiar characteristics except that scattered through the tumor are well-defined alveoli lined with high cylindrical epithelium which is often fatty. These alveoli bear a striking resemblance to the atrophic ducts of the submaxillary tissue which are adherent to the periphery of the tumor. At one portion of the growth near the periphery the alveoli are filled with flat epithelial cells which are arranged to form imperfect pearls. No cartilage is present in the growth, and very little mucous degeneration of the connective tissue is to be found. Fragments of this tumor were examined for glycogen both before and after hardening, but none could be demonstrated. Elastic tissue abundant. (Plate VII, Fig. 1.) Some areas of the tumor show excellently the production of the morphological appearances, which have been called cylindromatous by the softening of the connective-tissue trabeculae, many of which have undergone hyaline degeneration. (Plate VII, Fig. 2.)

CASE LIX.—The specimen has no record except that it was removed from the parotid gland. The amount of material indicates that the tumor must have been of the size of a man's fist. The larger portion of the growth is well encapsulated and endothelial in type. No cartilage is present. Other portions show a peculiar alveolar structure resembling a gelatinous carci-

PLATE I.

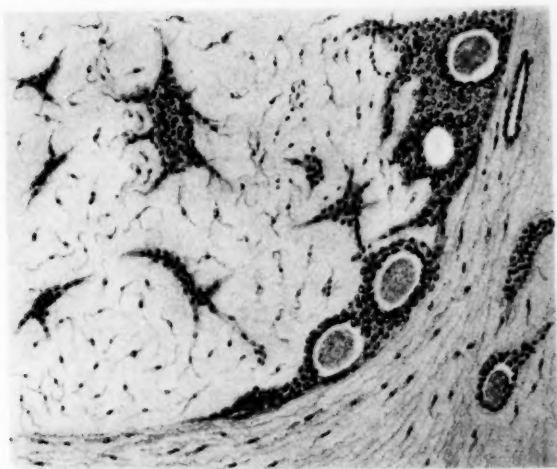


FIG. 1.—Case VI. Endothelial portion of the tumor from the cheek which contained epithelial pearls.

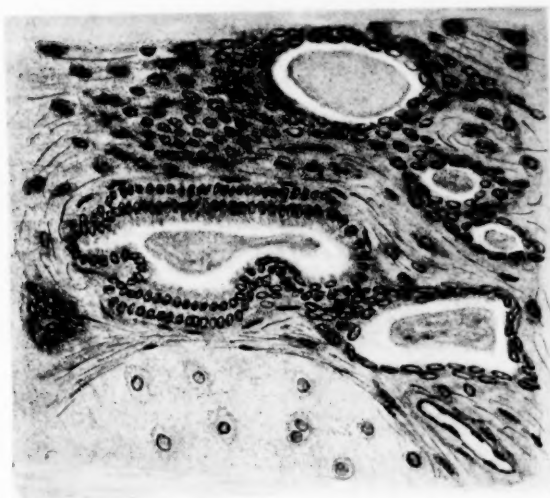


FIG. 2.—Case VI. Epithelial tubules, cartilage, and alveoli of the so-called endothelial type.

PLATE II.

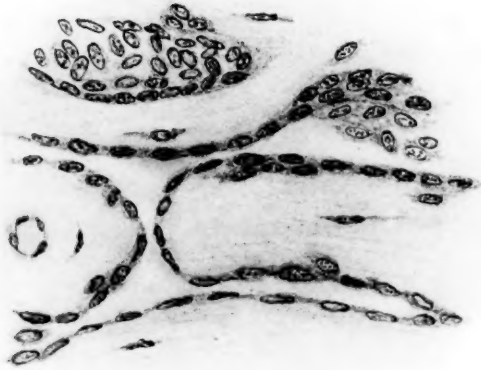


FIG. 1.—Case VI. Endothelial type of alveoli with flat cells lining the lymph spaces and spreading out into the surrounding connective tissues.

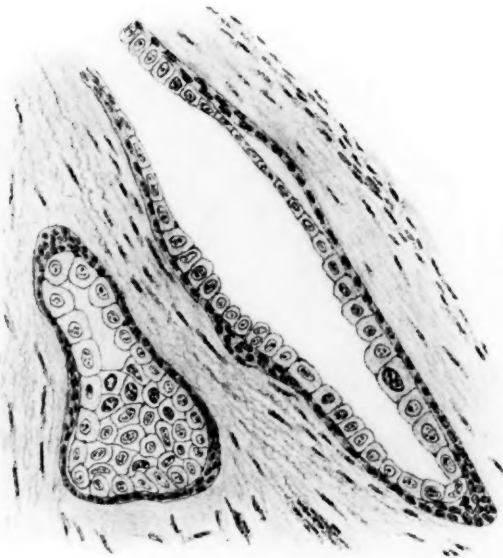


FIG. 2.—Case XX. Invasion of lymph spaces in a pharyngeal tumor by epithelial cells which leave the endothelial lining of the lymph space in its normal condition.

PLATE III.

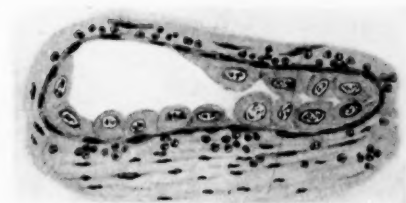


FIG. 1.—Lymph channel from the periphery of an axillary lymph node invaded by the cells from a carcinoma of the breast.

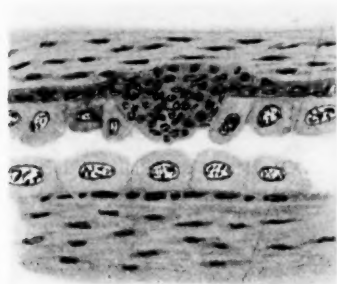


FIG. 2.—Case XX. A lymph space from tumor of the pharynx showing the proliferation of the endothelium displacing the epithelial cells of the tumor from their position on the walls of the space.

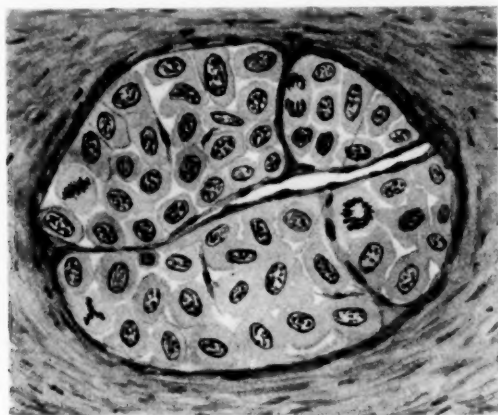


FIG. 3.—Case XIX. Section showing one of the alveoli and the close relationship of the cells to the blood-vessels.

PLATE IV.

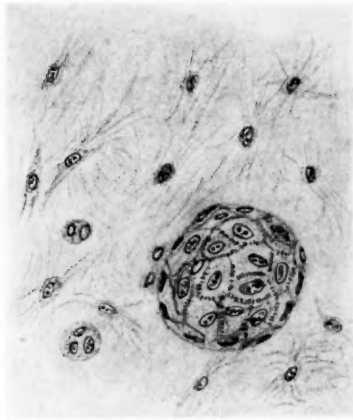


FIG. 1.—Cases VI and XXXII. Nest of epithelial cells in embryonic gelatinous tissue.

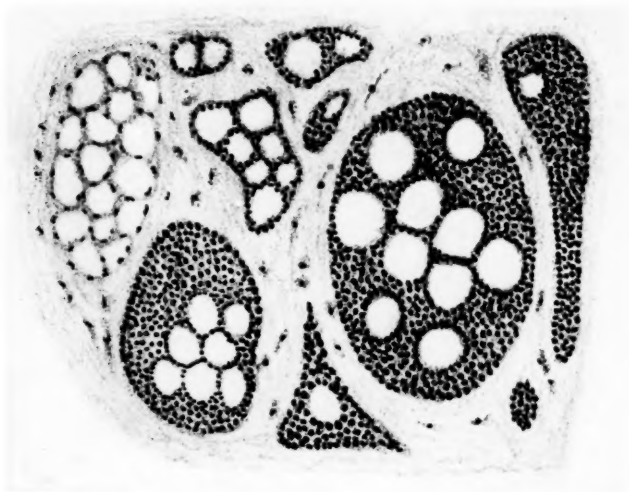


FIG. 2.—Case XVIII. Cylindromatous type of tumor from the neck.

PLATE V.

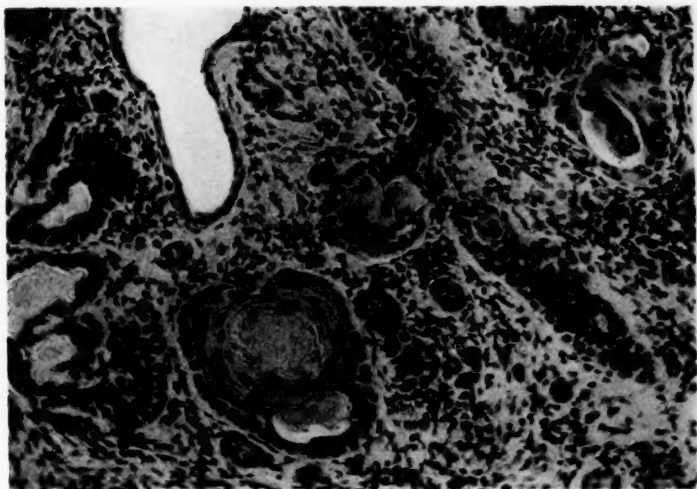


FIG. 1.—Case VI. Epithelial pearls in a tumor from the cheek near the parotid gland. Other portions of the growth are of the endothelial type.

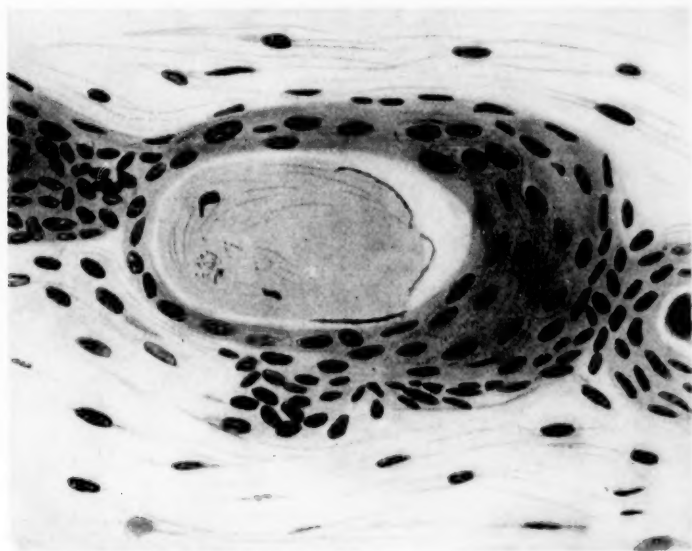


FIG. 2.—Case VI. Detail from one of the epithelial alveoli showing prickly cells and fibrillae in the epithelial cells. Kromayer's modification of Weigert's fibrin stain.

PLATE VI.

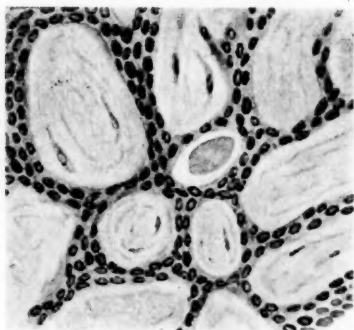


FIG. 1.—Case XXV. First recurrence showing alveolar arrangement of the cells of the tumor.

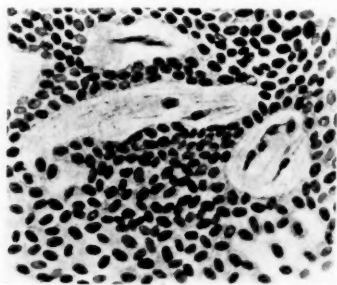


FIG. 2.—Case XXV. Second recurrence.

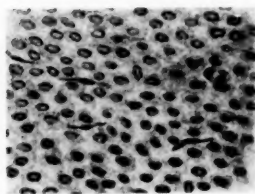


FIG. 3.—Case XXV. Third recurrence with approach to an indifferent type resembling sarcoma. Small connective-tissue spindle-cells can be seen lying between the cells of the tumor.

PLATE VII.

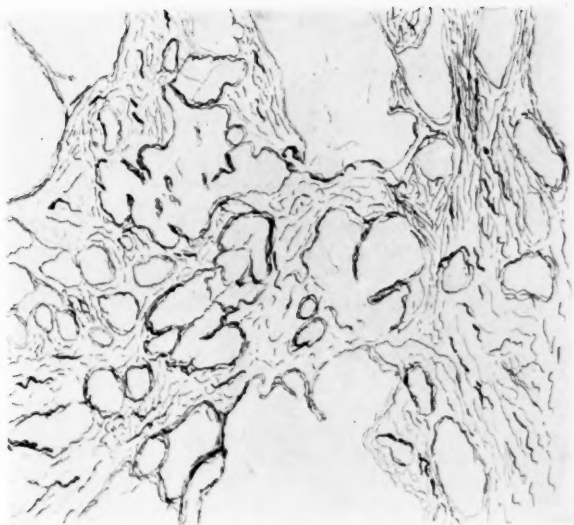


FIG. 1.—Case LVIII. Elastic tissue net-work stained by Weigert's method.

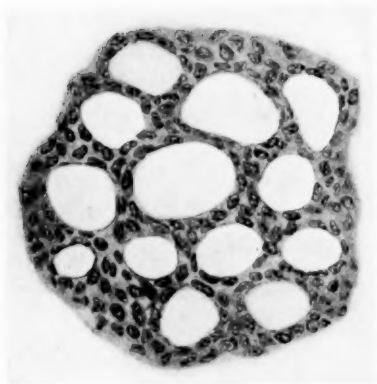


FIG. 2.—Case LVIII. Alveoli filled with colloid material.



FIG. 3.—Case XXXIV. Alveoli filled with mucus.

PLATE VIII.

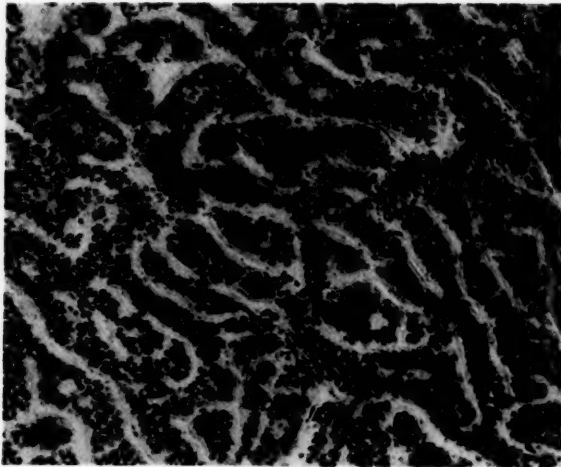


FIG. 1.—Case XLV. In this portion of the growth the parenchyma is more abundant than the stroma, which remains as a small hyaline layer along the course of the blood-vessels.

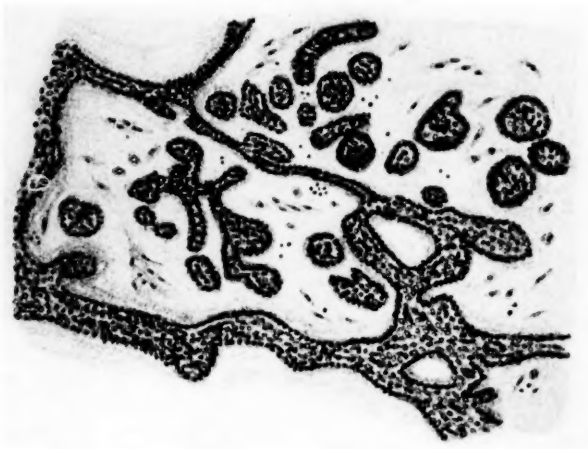


FIG. 2.—Case LIX. Portion of tumor with a large amount of mucous degeneration in the stroma.

noma which appears to be due to a large production of mucus crowding the cells of the tumor into strands. No flat epithelial cells with spines were found in the growth, which is chiefly interesting for its peculiar morphology; the transition between the endothelial portions and those resembling carcinoma being quite gradual. (Plate VIII, Fig. 2.)

[TO BE CONTINUED.]

EXCISION OF TUBERCULOUS MASS FROM LIVER.

BY ROBERT R. ROME,
OF MINNEAPOLIS, MINN.,

Professor of Gynecology in the University of Minnesota.

THE patient, Mrs. G., aged forty-two years, has never been seriously ill, but has been bilious all her life. Her father was strong and hardy, her mother suffered from some obscure liver trouble.

About the middle of August, 1902, she was suddenly taken with a severe pain in the right lumbar region, lasting about twenty-four hours. Since then her side has been painful. She experienced a difficulty in breathing, which difficulty increased until the breathing became very shallow on that side. She favored the right side, because there seemed to be a pulling pain, and she could neither sleep nor rest on that side.

In November following I was called to see her. I found her supporting her right side with hand placed over sore spot. When walking, she would bend somewhat to the right and stoop forward. Bimanual pelvic examination revealed nothing abnormal.

Abdominal palpation elicited an enlargement at a point midway between the cartilage of the tenth rib and the crest of the ilium, that is, in the centre of the right lumbar section anteriorly.

The enlargement was sensitive. I could not detect fluctuation. It was decided to try medicinal treatment for a month. At the end of this time her condition was no better, and she decided to be operated for the relief of her trouble.

On December 4 she entered the hospital, and on the following morning she was operated. An incision was made over the site of the tumor parallel to the outer fibres of the rectus muscle. Through this incision the appendix was located, and its chronic inflammatory condition called for its removal.

The gall-bladder was found contracted and retracted; no calculi could be detected. Directing search by the aid of the sense of touch along the edge of the liver, it was found that two and one-half inches of intestine were adhered to the liver. After separating the adhesions and freeing the bowel, further

exploration revealed a tumor in the lower right lobe of the liver. The surface of the liver corresponding to the tumor was firmly adhered to the parietal peritoneum. After freeing these adhesions, it was apparent that the section in which the tumor was situated could be removed in the shape of a wedge or triangle. This was mentally outlined, and heavy catgut sutures were introduced, beginning at the apex of the triangle and passed through the thickness of the lobe; the needle was reinserted and brought out opposite the first free end and left untied.

Sutures were introduced in this manner half an inch apart and half an inch from the margin of the triangle. After inserting a sufficient number of sutures, the wedge containing the growth was cut away with scissors, and the cut surfaces of the liver immediately brought together and the sutures tied. Approximating the surfaces in this way promptly checked the hæmorrhage. The size of the tumor removed was that of a goose-egg.

The abdominal incision was closed without drainage. There was some oozing of serum at the lower angle of the wound on the fourth day. The incision healed kindly and firmly, and the patient left the hospital in four weeks. She reports every month, and always with the same happy remark: "I am feeling better and stronger than I have for ten years." The difficulty in breathing disappeared almost immediately after the operation. She can now breathe deeply without any pain or discomfort. Slides were mounted by Drs. Westbrook and Ulrich and a diagnosis of tubercle made. The surface and substance of the liver were smooth and no nodules could be detected.

Dr. Keen, in the *ANNALS OF SURGERY*, gives a summary of the surgical conditions of the liver, and mentions the following tumors: Herniated left lobe, five cases; syphiloma, twelve cases; carcinoma, seventeen cases; angiofibroma, one case; cavernoma, one case; endothelioma, one case; angioma, four cases; adenoma, seven cases; sarcoma, five cases; cystoma, one case; small calculi, one case; hydatid cysts, twenty cases.

The case I have just reported adds another tumor to the above list, and for that reason alone I deem it worth while recording.

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, October 14, 1903.

The President, LUCIUS W. HOTCHKISS, M.D., in the Chair.

GUNSHOT WOUND OF THE ABDOMEN, WITH PENETRATION OF THE STOMACH, GALL-BLADDER, AND LIVER.

DR. GEORGE E. BREWER reported the case of a boy, sixteen years old, who was admitted to Roosevelt Hospital in July last. He stated that one hour before, while standing on the street corner, he heard the report of a pistol, and experienced a slight stinging sensation in the epigastric region. A few minutes later, feeling faint, he sat down on the curb. Some bystanders went to his assistance, and they found his clothes saturated with blood. He was immediately admitted to the hospital, where, upon examination, a small bullet wound was found one inch to the left and one inch above the umbilicus. The abdominal walls were rigid. There was generalized pain in the upper third of the abdomen, with tenderness on pressure in the immediate vicinity of the wound. The temperature was normal, the pulse 120 and of fair quality. The patient was exceedingly restless and apprehensive. He was immediately prepared for operation, and, under ether anæsthesia, a longitudinal incision was made in the median line, extending from a point one inch below the ensiform to a point one inch below the umbilicus. As soon as the peritoneum was opened, a considerable amount of blood issued from the wound. The stomach was somewhat distended, partly with undigested food and partly with gas. There were two wounds in the anterior surface,—one at the junction of the middle and outer third, the

other near the pylorus. A small amount of fluid issued from these wounds, which, however, were partly sealed by prolapse of the mucous membrane. This prevented extensive extravasation, which otherwise would have occurred. Further search revealed a wound of the gall-bladder, from which bile exuded in large quantities. The course of the bullet was traced in the substance of the liver through a large rent torn at the junction of the gall-bladder with the quadrate lobe. At the bottom of this rent a 32-caliber bullet was found and easily extracted. Further examination revealed a considerable amount of clotted and fluid blood in the pelvis and on either side in the neighborhood of the ascending and descending colon. The incision was immediately enlarged and the entire alimentary canal from the stomach to the rectum was thoroughly examined. The posterior wall of the stomach was explored and a rent was found in the transverse mesocolon. The stomach wounds were closed by continuous Lembert sutures. The wound in the gall-bladder was closed with some difficulty, owing to its ragged nature, and to the fact that it was situated near the junction of the gall-bladder and wounded liver. The blood-clots were thoroughly removed, and the entire peritoneal cavity was irrigated with a large amount of sterile salt solution. The parietal wound was closed with through-and-through silkworm-gut sutures and the dressings were applied. The patient did well for two days, when there occurred a sharp rise of temperature to 104.5° F., with a corresponding increase in the pulse-rate. He complained of intense pain in the abdomen, and he was exceedingly restless. On examination, the abdomen was found to be flat, but there was general tenderness and well-marked muscular rigidity. Believing that a spreading peritoneal infection was present, the abdomen was reopened under chloroform anæsthesia. As soon as the peritoneum was incised, a large amount of fluid bile issued from the wound. There was, however, no sign of peritonitis. The wound in the stomach was explored and found to be normal. The wound in the gall-bladder was apparently tight, yet there was an extensive leakage of bile from the liver wound. This was tightly packed with gauze, the cavity thoroughly flushed with salt solution, and the wound was partly closed with generous drainage. The patient thereafter made an uninterrupted recovery.

GANGRENOUS APPENDICITIS WITH EXTENSIVE RETRO-COLIC ABSCESS.

DR. GEORGE E. BREWER presented a man, twenty-seven years old, who had been admitted to Roosevelt Hospital in August last. He had been ill for ten days, the attack beginning with abdominal pain, nausea, and vomiting. There was some elevation of temperature, and a diagnosis of catarrhal appendicitis was made by his attending physician. As the symptoms improved after the first twenty-four hours, he was treated conservatively in the hope that he would recover from the attack and submit to an operation for the removal of the appendix in the interval. From time to time during the following eight days he had recurrences of pain and more or less elevation of temperature. There was never, however, any marked tenderness or muscular rigidity. When he was first seen by the speaker, the temperature was 101° F., the pulse about 90, and the patient complained only of slight discomfort in the right iliac region. On examination there was moderate rigidity over the lower half of the right rectus muscle. There was tenderness on deep pressure, but no palpable tumor. Examination of the blood revealed a leucocytosis of 16,000. He was immediately prepared for operation, and, under ether anæsthesia, an incision was made from along the outer border of the right rectus muscle. The abdominal wall was exceedingly thick, and the incision was extended until an opening six or seven inches in length was obtained. Through this a dense induration was felt beneath the cæcum and extending well up towards the kidney. Upon separating the adhesions a large abscess cavity was found containing nearly a pint of foul pus. The gangrenous stump of the appendix was found, which was densely infiltrated, as was the surrounding cæcal wall. Search for distal extremity of the appendix in the large retroperitoneal cavity was carried out with considerable difficulty, owing chiefly to the fact that the patient's condition became critical from the large amount of ether it was necessary to administer. After searching at least thirty minutes a small gangrenous mass was found and removed; this proved to be the separated appendix with a considerable portion of its mesentery. The wound was thoroughly disinfected and the abdominal incision partly united, two cigarette drains being left, one in the abscess cavity, the other in the region of the pelvis. The patient did well for

two or three days following the operation, but the drainage from this large cavity was never satisfactory, and at the end of five days the patient was again anæsthetized and a counteropening made in the loin. The large drainage tube passed from the abdominal incision through the abscess cavity beneath the colon, emerging from the wound in the flank. By means of this arrangement the cavity was thoroughly flushed with large volumes of saline solution, and at the end of five weeks the tube was removed, and only a few strands of silk allowed to remain. The patient made a satisfactory but slow recovery, and was discharged six weeks from the date of operation.

COMMON DUCT STONE WITHOUT CHARACTERISTIC SYMPTOMS.

DR. GEORGE E. BREWER presented a woman, twenty-two years old, who had been admitted to Roosevelt Hospital during the summer. During the past four years she had complained of occasional attacks of indefinite abdominal pain and, occasionally with them, slight jaundice. Four months ago she had an attack which was quite severe and accompanied by a marked jaundice, which lasted four or five days, gradually subsiding. Since then she had had more or less discomfort in the upper right quadrant of the abdomen, but no acute pain, fever, or jaundice. Abdominal examination was absolutely negative, with the exception of slight tenderness on deep pressure over the gall-bladder region. There was no leucocytosis. A diagnosis of cholelithiasis was made. An incision was made under ether anæsthesia along the outer border of the right rectus muscle. The gall-bladder was found to be normal and free from calculi, as was the cystic duct. Along the free border of the gastro-hepatic omentum a hard, movable body was palpated in the common duct. This was readily brought to the surface of the wound. After clearing the duct a longitudinal incision was made, through which a single round calculus was removed. A probe passed readily from the common duct into the duodenum. The common duct wound was closed by the Mayo method and a small strip of gauze was left leading into the duct wound. The abdomen was partly closed, the drain being allowed to remain in place twelve hours, after which the wound promptly closed, and an uninterrupted recovery followed.

COMMON DUCT STONE WITH ACUTE SEPTIC CHOLANGITIS.

DR. GEORGE E. BREWER presented a male, fifty-two years old, who had complained for several years of characteristic gall-stone colic. Ten years ago he was jaundiced. The speaker first saw him during the winter of 1902, when he was moderately jaundiced and complained of occasional attacks of pain in the upper right quadrant of the abdomen, which were accompanied by chills and fever. The gall-bladder region was tender, but no tumor could be palpated. A diagnosis of common duct stone was made and an operation advised but refused, the patient then disappearing from observation. One year later he was again seen in consultation. He was deeply jaundiced, and complained of moderate pain in the gall-bladder region, which frequently became worse. With this increase of pain there followed chills, fever, and sweating. There was a moderate leucocytosis, but no plasmodia were found in the blood. Under ether anaesthesia an incision eight inches long was made over the right rectus muscle. The gall-bladder was thickened and contained thirty-five large and small stones and turbid bile. Two stones were found in the common duct, each the size of a small hazel-nut. Removing these the patency of the duct was re-established by means of a probe passed into the duodenum, and the hepatic duct was drained by the Mayo method. The stones were next removed from the gall-bladder, which was then drained. The abdominal wound was partly closed; room being left for the gall-bladder and duct drains. For ten days or two weeks the temperature remained elevated, and there was an abundant flow of bile from the wound. At the end of the second week all drainage was removed. The gall-bladder wound closed promptly, but there remained considerable leakage from the duct. Ten days after operation bile appeared in the stools, and about the second week the jaundice began to disappear. Six weeks after operation the wound closed and the jaundice had practically disappeared. The patient had been in perfect health since.

GUNSHOT WOUND OF THE FACE.

DR. HOWARD LILIENHAL presented a boy, fifteen years old, who four weeks before had been accidentally wounded by a bullet

fired from a 38-caliber bull-dog revolver at a distance of about six feet. The bullet entered the left cheek at a point over the root of the first bicuspid tooth. It emerged through the left auricle, just close to the base of the mastoid process at a level fully one-quarter of an inch above the auditory canal. It did not perforate or injure the mucous membrane of the mouth nor did it perforate or injure the walls of the auditory canal. The case had been seen by a neighboring physician, who had packed both wounds and applied a firm dressing. About one hour later Dr. Lilienthal removed the packing from the posterior wound and evacuated several drachms of blood. The packing was not removed from the anterior wound. A firm bandage was applied over a dry dressing. The recovery was absolutely uneventful, with the exception of some limitation of motion of the lower jaw. He presented the case as an illustration of the remarkable course sometimes taken by projectiles of this kind. It was surprising that, with so large a bullet, no laceration of the mucous membrane of the mouth had occurred, and also that, although the auditory canal was in the direct path of the bullet, it was not injured. He believed that in case of slow-going projectiles, such as a bullet from a bull-dog or smooth-bore revolver, the cartilage of the auditory canal had been pushed up out of the way of the passing ball.

FRACTURE OF THE FEMUR, WITH SUBSEQUENT SPONTANEOUS REFRACTURE.

DR. FRED. KAMMERER presented a patient who, some years ago, had sustained a fracture at the junction of the middle and lower third of the left femur. The case had run the usual course, resulting in firm union and restoration of the function of the limb. Last May, after lifting a heavy load, he felt a pain in the upper part of the limb, and since then an angular deformity had been gradually developing at this point accompanied by some enlargement of bone. At the present day the patient presented the following appearance: The left thigh was markedly curved with outward convexity, the most prominent point of which was situated between the upper and middle third. At this point the bone appeared to have about twice its normal thickness. A distinct groove, running in a transverse direction, was easily felt

through the skin, and evidently marked a spontaneous, partial fracture. This was corroborated by the X-ray picture. The picture furthermore showed marked changes in the medullary cavity of the bone, the space evidently being occupied by some foreign substance. The question arises as to the nature of the growth within the medullary cavity, which had caused a spontaneous, partial fracture. Syphilis could be excluded, as there was no specific history, and the exhibition of antisyphilitic remedies had had no effect. A sarcoma was not probable, as the growth had been so slow. Slowly growing tumors had been described in medical literature (chondromata, fibromata), but the speaker had had no experience with them. He presented the case in the hope that a discussion might bring out points to clear up the diagnosis.

CANCER OF THE PYLORUS.

DR. FRED. KAMMERER presented a man, of about forty years, on whom he had operated for cancer of the pylorus. When first seen last February an intra-abdominal tumor could be easily made out, but the condition of the patient was such that a posterior gastro-enterostomy only could be considered. The hæmoglobin had been reduced to 33 per cent. of the normal. The operation was done and the patient recovered, passing the Murphy button at the end of about two weeks. Eight weeks later, the hæmoglobin having increased to 45 per cent., the growth was excised and the ends of the incision closed by suture. The patient did well. His weight at once increased about forty pounds, and the blood contained about 65 per cent. hæmoglobin. The speaker said that a primary gastro-enterostomy with subsequent excision of a cancerous tumor was not the operation of choice. He had attempted it several times, and found that the conditions in the abdomen after the primary operation changed so much that secondary excision generally became impossible, owing to adhesions. Even in this case, where the tumor had been movable in the first instance, the secondary operation proved to be very difficult. The case showed, however, what could occasionally be accomplished, and he emphasized the importance of early exploratory laparotomy in cases of suspected cancer of the stomach.

CHOLECYSTOTOMY.

DR. IRVING S. HAYNES presented a woman, fifty years of age, who was admitted into the Harlem Hospital, November 1, 1902, with the history that nine weeks before she began to suffer from acute pain in the right hypochondriac region, with occasional vomiting. Her condition became gradually more aggravated and deep jaundice developed. When admitted, the icterus was extreme; temperature, 99.2° F.; pulse, 98; respirations, 30. November 2, through an incision parallel with the costal arch, the gall-bladder was exposed, after dividing extensive adhesions between liver and omentum. The gall-bladder was small and firmly contracted down upon a mass of calculi. These were removed through an incision in the gall-bladder, to which a rubber drainage tube was tied by a purse-string ligature. Adhesions were dense and matted everything together, and the calculus causing the trouble could not be located without a systematic search, which the patient's condition did not justify. Therefore the gall-bladder and drainage tube were surrounded with iodoform gauze and brought up at the inner angle of the wound, and the remainder of the incision closed with through-and-through silkworm-gut sutures. Under free stimulation and normal salt solution enemas, one quart every four hours, the patient rallied. No bile had escaped from the incised gall-bladder at the time of the operation, but within twenty-four hours the dressings became stained with it, and during the next day twelve ounces of bile were collected, and about a pint every day thereafter for nearly a month. The urine cleared up rapidly and the icterus gradually disappeared. Bile did not appear in the feces until after the fifth day, when a calculus was passed by the patient (but not saved by the night attendant), though most of this excretion was discharged through the tube until towards the last of the month, when it was removed.

The patient was discharged December 20. The biliary discharge from the fistula was intermittent, but finally ceased in February. The fistula, however, did not close permanently until the last of July. The case was presented to illustrate complications present in cholelithiasis of long duration. There were dense and universal adhesions, obliterating all the normal anatomical landmarks, and a small, thick, contracted gall-bladder filled with

calculi. The operation was incomplete from a theoretical standpoint, owing to the precarious condition of the subject, which contraindicated any radical procedure. The cystic duct was not patent at the operation, and the common bile duct was left occluded. Nature stepped in and perfected a complete cure by forcing open the cystic duct and discharging the common duct stone into the intestine. This emphasizes the opinion that, although choledochotomy and cholecystectomy are the theoretical and proper procedures to be carried out in common duct obstruction, still, when it is a question of our patient dying on the table under the more radical procedure, or being sent away alive and nature given help by a simple cholecystostomy, surely the latter alternative is to be preferred.

TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, October 5, 1903.

DE FOREST WILLARD, M.D. in the Chair.

THREE CASES OF PERFORATED GASTRIC ULCER AND ONE CASE OF PERFORATED DUODENAL ULCER.

DR. JOHN H. GIBBON reported these cases, all of them having been operated upon during the present year.

CASE I.—A healthy-looking young man, eighteen years of age, was sent into the Bryn Mawr Hospital, January 12, 1903, by Dr. T. F. Branson, of Rosemont, and operated upon on January 13, 1903. The patient had been well except for some gastric discomfort, until the day of admission, when he was suddenly seized with severe abdominal pain. The sudden onset of pain occurred at 5.30 P.M. Dr. Branson saw the patient at 9.30 P.M., and Dr. Gibbon operated at 9.30 the next morning. When the abdomen was opened considerable flocculent fluid was found and the pelvis filled with it. The appendix was long, slightly adherent, and considerably inflamed. There was, however, no lymph about it, and it was not in a sufficiently bad condition to have been the cause of the general inflammation. The ileum was examined and found normal. Exploration was then carried up the colon, and the hepatic flexure with the omentum in its neighborhood was found covered with lymph. The incision was extended to the costal border and the duodenum found to be covered with lymph. When a portion of this was removed, a perforation into which a duck-shot could have been placed was found in the first portion of the duodenum. The perforation was inverted with difficulty because of the friability of the tissue sur-

rounding it. However, three sutures deeply placed inverted it. The cavity was thoroughly irrigated with salt solution. Iodoform gauze was packed about the duodenum and hepatic flexure of the colon. The body of the stomach appeared normal. A gauze drain was then introduced into the pelvic cavity and the wound closed in layers. The patient was in an extremely bad condition during the latter part of the operation, requiring the administration of oxygen: he, however, recovered promptly, and seemed in good condition a short time after the operation. The wound became infected and necessitated the removal of a number of the sutures. The gauze packing was gradually removed and the wound ultimately closed. The patient was fed by the rectum for three weeks, receiving nothing by the mouth excepting small quantities of water. An exception to this diet, however, occurred about two weeks after the operation, when he obtained and ate two and a half sticks of peppermint candy. This, however, produced no trouble, and he was discharged on February 27, 1903. After the operation it was revealed that the patient had had attacks of pain in the abdomen, but never sufficient to require a medical attendant. He suffered from pneumonia one year before operation, had never had typhoid fever, and had never been burned. He has been seen a number of times since his operation and has been perfectly well. He eats everything and suffers no discomfort. He has no hernia.

The interesting points in this case are: the fact that there was nothing in the patient's previous history which could possibly indicate a duodenal ulcer; the attacks of pain which have been spoken of were believed to have been due to the appendix. He had never had attacks of vomiting nor had he ever passed blood by the bowel. His pain and rigidity were present to a marked degree over the lower half of the abdomen, but more especially on the right side, and therefore the diagnosis of a perforative appendicitis seemed the most likely one. Another interesting point in the case is the length of time which the patient was kept upon rectal feeding. The rectal enemata consisted entirely of malted milk, which was suggested by Dr. Walter Chrystie, who had found it to be well retained and non-irritative.

CASE II.—A rather emaciated man of about fifty years, seen in consultation with Drs. Patrick and Sharpless, of West Chester,

Pennsylvania. This patient had for several years been under the care of Dr. Patrick, who had treated him for gastric trouble. On Friday, April 6, 1903, at three o'clock, the patient, in lifting a buggy, was suddenly seized with excruciating pain in the upper part of the abdomen. Dr. Patrick did not see him until late the same evening, when he was somewhat more comfortable, the result of a hypodermic injection of morphia which had been given. Dr. Sharpless saw the patient with Dr. Patrick, and agreed in the diagnosis of perforated gastric ulcer. The patient's family, however, would not consent to his removal to a hospital or to a surgeon seeing him until the afternoon following the perforation. He was seen by Dr. Gibbon first at ten o'clock on Saturday evening, thirty-three hours after the perforation had occurred. At this time he presented all the symptoms of a general peritonitis; the abdomen was distended, rigid, and painful, especially over the upper portion; the temperature had risen to about 101° F. and the pulse was 130 and weak. The patient was sweating and his facial expression was that of peritonitis. Two hours were consumed in obtaining consent for the operation from the patient's family and in removing him to the West Chester Hospital, which was but a short distance from his home. The operation was performed at midnight. When the abdomen was opened, a large quantity of yellowish fluid escaped with considerable gas. A large perforation was readily found in the anterior wall of the stomach at the greater curvature near the pylorus. The perforation was sufficiently large to admit the tip of the little finger. Because of its size the perforation was closed with considerable difficulty with catgut sutures. The stomach and the liver in its neighborhood were covered with thick lymph. After the closure of the perforation a second opening was made above the pubes and the pelvic cavity found to contain a large amount of fluid. The whole abdominal cavity was thoroughly irrigated with salt solution. In spite of stimulation, the patient's condition on the table became extremely bad. Gauze drainage was introduced into the pelvis and down to the site of perforation. Immediately after the operation a quart of salt solution was introduced into the patient's circulation. After the operation consciousness was promptly regained, and he was quite comfortable for several hours. In spite of stimulation, however, he died eleven hours after operation.

CASE III.—An anæmic girl of seventeen years was sent into the Bryn Mawr Hospital by Dr. George MacLeod on the first of May, 1903, and was operated upon the same day four hours after admission, about seven hours after Dr. MacLeod saw her. She was taken ill with pain in the abdomen about thirty-six hours before admission, but this did not become severe until about eight hours before admission, when she was greatly collapsed. Upon her admission the abdomen was slightly distended, and there was exquisite tenderness on the left side, and the left rectus muscle was absolutely rigid. It was stated that a mass could be felt in the pelvis by rectal examination. The patient's temperature was 100° F. and pulse 116. No history of previous gastric symptoms could be elicited; because, however, of the suddenness of the attack and the localized point of tenderness on the left side near the umbilicus the reporter concluded that he had probably to do with a perforated gastric ulcer. The abdomen was opened below the umbilicus and the pelvis found to contain a quantity of dark yellow fluid containing flakes of lymph. The omentum above this incision was found adherent to the abdominal wall, therefore a second opening was made in a median line above the umbilicus. A perforation was found in the anterior wall of the stomach near the pylorus and lesser curvature: it was about one-quarter of an inch wide and three-eighths of an inch long. It was closed without difficulty with catgut sutures. The extravasation of fluid had been so extensive in this case that all of the small intestine was removed from the abdominal cavity and a most thorough irrigation with hot solution performed. A plain gauze drain was introduced into the pelvis and several iodoform gauze drains placed in the upper part of the upper wound, one being put directly over the point of perforation. The patient's condition on the table was bad, but she responded promptly to stimulation. The after-treatment was the same as in the first case, and the patient did well for about two weeks, when she showed some symptoms of obstruction of the bowel, which were accompanied by a rise in temperature and considerable abdominal pain. These symptoms progressed until it was quite evident that to relieve them the abdomen must again be opened. At this time, the seventeenth day after the first operation, the upper wound had practically healed, but there was still some discharge of pus from the lower wound. The gauze drain at this time did not extend deeply. The patient was anæ-

thetized and the lower wound reopened. The small intestine was found matted together in a number of places, but in one place there was a distinct kink which might readily have produced all the symptoms of obstruction. In addition to this condition, however, it was found that the lower part of the pelvis was filled with foul pus. After liberating the adherent cavity and thoroughly irrigating the pelvic cavity drainage was introduced and the patient returned to bed. After the operation she improved somewhat, but died from sepsis on the seventh day after the second operation and the twenty-fourth day after the first operation.

This case was one of subacute perforation with the discharge of the gastric contents into the pelvis, and, but for the complication which arose two weeks after the operation, the patient would have recovered, and this complication was the result solely of failure to reintroduce the pelvic packing sufficiently deep to keep up drainage. It is often difficult to reintroduce the packing as deep as it ought to go, and surgeons are too frequently content to get it simply within the peritoneal cavity.

CASE IV.—This patient, a man forty-five years of age, was admitted to the Pennsylvania Hospital on October 1, 1903, and was operated upon immediately. He had suffered for five years from what was supposed to be a duodenal ulcer; he was under the care of several capable men who carried out a rigid treatment. Previous to his admission he had been in bed for a number of weeks on rectal feeding, but during the past week has been allowed soft diet. He had never vomited blood until recently, but had vomited dark material, and melæna had been marked. At six o'clock on the morning of the day of his admission to the hospital, after a comfortable night, he was suddenly seized with severe pain in the epigastrium, accompanied by marked rigidity but no vomiting. Between seven and eight o'clock he was given two one-quarter of a grain doses of morphia hypodermically and then brought to the Pennsylvania Hospital from his home in Moorestown, New Jersey. When first seen by Dr. Gibbon at 2 P.M., his pulse was 112, respiration 24 and entirely costal, and temperature about normal. Soon after the onset of pain in the early morning his temperature was subnormal. His facial expression was bad, though he was not sweating. The abdominal wall was rigid, especially on the right side, in spite of the morphia which he had received. He was unable to pass his urine, though

he had no pain in the lower portion of his stomach. There was a point of tenderness in the epigastrium. When the abdomen was opened through the right rectus muscle a quantity of yellowish fluid containing small flakes of lymph escaped. The gastrocolic omentum was slightly adherent on the right side; the great omentum, however, was entirely free excepting over the right kidney, where it apparently had been adherent for a long time. The duodenum was quite free, and there was no evidence of ulceration in it. On the anterior wall of the stomach, however, about one and a half inches or two inches from the pylorus, and just bordering on the lesser curvature, there was an area covered with lymph, which was removed and two points of perforation about the size of a head of a pin discovered. The lesser omentum was extensively adherent around the ulcer. Because of the situation of the ulcer exactly at the lesser curvature, it was difficult to close it, and in doing so the operator was obliged to utilize the lesser omentum, sewing it firmly to the gastric wall beyond the perforation. The abdominal cavity was then irrigated throughout, a small suprapubic opening being made and a glass drainage tube introduced to the depth of the pelvis. A large gauze drain was placed over the point of perforation and the upper wound partially closed. The lower wound was drained with a glass tube, into which was passed a gauze wick. The operation required thirty minutes, and the patient stood it very well. He was anæsthetized first with chloride of ethyl, which was followed by ether. At the end of the operation his pulse was 120, his temperature a little above the normal, and he was in fairly good general condition. It seemed evident, from the appearance of the adhesions about the ulcer, that an earlier perforation had been prevented by the adherence of omentum, and that with the progression of the ulceration the omentum proved an insufficient control. It seemed wise to do a thorough irrigation of the abdominal cavity because there was considerable free fluid, and the pelvis was drained because a number of pieces of lymph passed up through the tube during the irrigation.

October 10.—Tube has been removed from pelvis and gauze drain in upper wound changed twice. Temperature has been normal for a number of days, and there has not been a single bad symptom since operation. The rectal feeding continues satisfactory, and the patient bids fair to make a satisfactory recovery.

DR. WILLIAM L. RODMAN said that gastro-enterostomy is hardly radical enough for the treatment of non-perforating gastric ulcer. It is not certain that it will relieve hæmorrhage; it does not remove the lesion; it does not enable the surgeon to determine if there be more than one ulcer; and it does not get rid of cicatrices which later on may undergo malignant degeneration. According to the best authorities at least 6 per cent. of gastric ulcers terminate in carcinoma. The frequency of perforation, hæmorrhage, and other complications of ulcer, many of them occurring most unexpectedly, would make it seem wise in the future to excise the ulcer-bearing area before such complications occur. This can be done without great difficulty or risk of danger, as in probably 80 per cent. of all cases the ulcers are near the pylorus and the lesser curvature of the stomach, and can easily be excised at one time. The mortality from this operation should not be more than from 5 to 10 per cent., while the mortality from gastric ulcers treated by medical means is known to be much higher, some writers placing it as high as 50 per cent. Dr. Rodman closed by asserting his belief that the future treatment of gastric ulcer should be largely operative, and consists in excision of the ulcer-bearing area instead of simply the ulcer itself. In his advocacy of this method at recent meetings of national societies, he has found that similar views are held by many eminent surgeons.

DR. MORRIS J. LEWIS stated that he had seen in consultation with Dr. J. A. Scott, one year ago, the fourth case reported by Dr. Gibbon towards the close of the patient's fourth attack. At this time the symptoms, it was thought, pointed rather more to duodenal than to gastric ulcer. There had been epigastric distress coming on some time after eating, and blood in the evacuations, with some nausea, but without vomiting. During the summer the patient improved greatly and gained fifty pounds in weight. One month ago, symptoms of trouble reappeared; there was pain two or three hours after eating, and vomiting of blood. Under rectal feeding the symptoms ameliorated, but one week after recommencing very careful feeding by the stomach the patient awoke with excruciating pain in the left shoulder-blade, which soon transferred itself to the cardiac region and then to the epigastrium, when the diagnosis of perforation was made and the patient brought to the hospital.

Pain in the scapular region as a symptom of gastric perforation is unusual, and worth remembering.

DR. J. ALISON SCOTT said that the physical signs in the case referred to by Dr. Lewis presented some interesting points in diagnosis, it being distinctly an atypical case, if one is to believe text-book statements. It is stated that gastric ulcer is found in cases of extreme hyperacidity, and that the result of an old ulcer is usually puckering of the tissues, resulting in more or less obstruction of the pylorus. Hence we should expect to find a dilated stomach and hyperacidity of its contents. In the case under consideration there was not only the absence of hyperacidity, but there was actually anacidity, and the patient's stomach was absolutely normal in size. These points, in conjunction with the facts that there was no vomiting, and that the blood in the stools was fully digested and recognized only by chemical tests, made the diagnosis of gastric ulcer in the early stages of the case extremely difficult. The history during the month preceding perforation, although he did not then see the case, was more that of the typical symptoms of gastric ulcer. Dr. Scott believes that cases of gastric ulcer are not so common in this country as in England. In a somewhat extensive hospital experience he has not seen more than ten to fifteen cases, and has never in his hospital or private practice been in charge of a case when perforation occurred.

DR. ADDINELL HEWSON said that the presence of fluid in the lower right portion of the abdomen, and the consequent rigidity of the abdominal wall in that region as found by Dr. Gibbon in his cases, can be explained by the anatomical relations of the involved structures. The attachment of the mesentery extends downward from left to right, and the omentum in its projection downward from the stomach extends more to the left than to the right. The mesentery is attached to the posterior abdominal wall, the intestines occupy the space forward, and the duodenum, under the greater curve of the stomach and the omentum, fills in the interval between. Hence fluid from the perforations in question will first pass downward on the right side. Later it may pass upward and towards the left, but not until the lower right portions of the abdomen are occupied by the fluid which follows the posterior attachment of the mesentery to the parietal peritoneum. When the perforation is on the posterior wall of the stomach, the course would not be the same were it not for the fact that the

mesenteric attachment of the pyloric end is not so long as that of the cardiac end. Even when the fluid comes from a perforation on the ventral wall of the stomach, it is possible for it to take the same direction as when it comes from the duodenum or the pylorus or the posterior wall.

DR. FRANCIS T. STEWART reported two cases of perforation of the stomach operated upon with recovery of both. The first was that of an apparently healthy bar-tender aged twenty-four years, who had never suffered from indigestion, and who had never vomited blood or passed blood from the bowel. Soon after taking a hearty dinner of lamb chops and peas the patient was seized with severe pain in the epigastric and umbilical regions, and later vomited the materials composing the dinner, but no blood. When seen soon after there was general tenderness and rigidity, but most marked over the right upper quadrant of the abdomen. Liver-dulness was present, and there was no dulness in the flanks. The leucocyte count was 18,000, and within an hour rose to 19,000. Blood-pressure was 235. A diagnosis of perforated gastric ulcer was made and operation performed five hours after its occurrence. A perforation one-eighth inch in diameter was found one-half inch from the pylorus near the greater curvature of the stomach. It was closed with a purse-string suture reinforced by Lembert sutures. A second abdominal incision for drainage was made below the umbilicus. Recovery followed.

The second case was that of a gunshot wound of the stomach in a boy of eleven years, the bullet having entered below the costal arch on the left side. When the patient was seen four hours after the injury there was abdominal rigidity, though neither this nor tenderness was marked; liver-dulness was present, and there was no dulness in the flanks. There was no vomiting. Operation was performed four hours after the injury was received. The bullet had passed through the stomach near the cardiac end. Both wounds were closed by purse-string, reinforced by Lembert, sutures; the abdomen closed without drainage, and the bullet removed from where it was lodged immediately beneath the skin of the back. Both patients made uneventful recoveries.

DR. GIBBON, in closing, emphasized strongly a point mentioned in his paper, namely, the extensive induration of the stomach wall in his fourth case. He referred to the number of cases of supposed gastric cancer, reported as such, in which

gastro-enterostomy has been followed by recovery and apparently by the disappearance of the cancer. These probably have been cases of ulcer with pronounced induration. In the case in question, Dr. Gibbon believes that if the induration present had been in the pylorus he would have pronounced it malignant. He recalled the case of a woman upon whom he had operated, and who had a clear history of gastric ulcer some ten or twelve years previous. When he saw the patient she was vomiting, and presented other symptoms of acute obstruction of the pylorus. Operation revealed a mass that was thought to be pyloric carcinoma. The patient was anæmic and in bad general condition, and gastro-enterostomy was performed with the idea of doing a subsequent pylorectomy if the patient's condition improved sufficiently to warrant that operation. She vomited a great deal after the operation, and did not do well for a time, but finally made a good recovery. Her condition now is satisfactory enough to support the hope that the pyloric mass was only an extensive infiltration around an old gastric ulcer.

TWO CASES OF PERFORATION DURING TYPHOID FEVER TREATED BY OPERATION ENDING IN RECOVERY.

DR. ROBERT G. LE CONTE said that in reporting these two cases, and referring to a third one, the three having been operated upon last month at the Pennsylvania Hospital, he did not wish to give the impression that the operative cases of that institution are always successful. Their statistics in this dreaded complication are just as bad as those of other hospitals, and it is simply a coincidence that two cases following each other should have been successful. The third case mentioned occurred in the service of Dr. Gibbon, which recovered from the primary operation, but died ten days later from a secondary perforation.

CASE I.—J. S., hatmaker, Russian Jew, aged thirty-eight years, was admitted to the Pennsylvania Hospital July 21, 1903. Owing to his nationality, it could be learned only that the patient had been ill in bed four weeks with fever. He was evidently suffering from an attack of typhoid fever of moderate severity. On admission his temperature was $102\frac{2}{5}^{\circ}$ F.; respirations, 32; pulse 108, regular but weak. Tongue moist, slightly coated, very tremulous; lips covered with sordes; abdomen soft, rounded, no tenderness and no spots. Spleen easily palpable but not tender.

Urine showed faint trace of albumen without casts. The day after admission a Widal test was made, and another five days later, both proving negative. The fever ran a moderate course, and twelve days after admission the temperature touched normal for the first time. The convalescence from this time on was uninterrupted, and the patient left the hospital August 17, fifty-six days after the onset of the attack.

He was readmitted to the medical wards under the care of Dr. Stengel, September 8, 1903, twenty-two days after his discharge from the hospital, complaining that for the past few days he again had fever and felt badly. The temperature was $103\frac{3}{5}^{\circ}$ F.; pulse, 112; respirations, 28; tongue coated white, edges and tip red, very tremulous; a few râles posteriorly on the right side of the chest. Spleen enlarged, palpable, and tender; abdomen well rounded, soft, flabby, slightly tender, with a few suspicious rose spots. Urine, slight trace of albumen and a few hyaline and granular casts. A Widal test was suggestive but not positive. For a week the man went through a moderately severe relapse, with quite marked hebetude. He received thirteen baths and fourteen sponges, one alternating with the other when his temperature rose to 102° F. or over. On the evening of the 15th of September, the eighth day after admission, he informed the night nurse that he had had pain in the abdomen for the greater part of the day, but that it did not become severe until 7.30 P.M. At five o'clock that day his temperature was $101\frac{1}{5}^{\circ}$ F., and at 9 P.M. it had fallen to $97\frac{4}{5}^{\circ}$; respirations, 24; pulse, 100. At 10.30 the patient broke into a profuse perspiration, with shallow respirations and anxious expression. At this time the temperature was $97\frac{3}{5}^{\circ}$ F.; pulse, 140; respirations, 40; abdomen tympanitic, rigid, and tender, especially on the right side. A diagnosis of perforation was made, but permission for operation was delayed until friends could be communicated with. At 2 A.M., September 16, ether was administered, and a three-inch incision made in the right semilunar line below the umbilicus. This was three hours and a half after the patient showed signs of collapse, six hours and a half after the onset of severe pain, and perhaps fifteen or eighteen hours from the first pain noticed. On opening the abdomen, some cloudy, non-odorous fluid escaped. The cæcum immediately presented. It was brought out of the abdomen and a search for perforation was begun at the ileocæcal valve.

About eight inches from the cæcum a large inflamed Peyer's patch was found in the ileum, with a perforation in the centre about the size of the lead in a pencil. This was invaginated with a running Lembert suture of silk reinforced with three or four interrupted Lembert sutures. No other inflamed areas were discovered on the bowel. The pelvis contained some turbid fluid, but no lymph flakes. The operating table was tilted so that fluids would gravitate to the pelvis and to the right side of the abdomen while the cavity was being irrigated with salt solution. The pelvis was then mopped dry, a rubber tube inserted to the bottom, and five wicks of gauze were run in various directions between the coils of intestine to a distance of two or three inches from the wound. One suture was then passed through the wound and tied to retain the intestines within the abdominal cavity, the remainder of the incision being filled with gauze. Time of operation, thirty minutes. The patient reacted well, and vomited once a small amount of dark brown liquid. Temperature immediately after operation, $98\frac{2}{5}^{\circ}$ F.; pulse, 128; respirations, 40. The convalescence was uninterrupted, but movements of the bowels had to be secured by enemata of soap and water. The gauze wicks were removed forty-eight hours after operation and the tube leading to the pelvis on the seventh day. The latter was replaced by a narrow wick of iodoform gauze. The temperature reached normal eight days after operation, and convalescence was uninterrupted. Cultures taken from the peritoneal fluid at the time of operation showed numerous streptococci pyogenes, and also a few streptococci pyogenes aureus.

It will be noted that in this case at the time of his first attack of fever the Widal reaction proved negative, and during the relapse the Widal was only suggestive, and not positive.

CASE II.—A. G., Russian laborer, aged twenty-one years, was admitted to the Pennsylvania Hospital August 25, under the care of Dr. Stengel. He had been ill for ten days previously with fever, headache, slight cough, and hebetude. Examination revealed a well-built, well-nourished man; tongue coated, edges and tip red; a few râles in the upper lobe of the right lung, with slightly diminished resonance. Abdomen well-rounded, tympanitic, soft, with slight tenderness, and no pain. Spleen enlarged, palpable, and tender. Surface of abdomen and chest showed several rose spots. Urine contained trace of albumen and a few

hyaline casts. Widal test positive. His temperature shortly after admission was $104\frac{4}{5}^{\circ}$ F.; pulse, 104; respirations, 24. Tubing was resorted to each time the temperature reached 102° or over, and in the next six days he received twenty-eight baths. At this time, estimated the sixteenth day of the disease, immediately after a bath at 6 P.M., he complained of sharp pain in the right side of the abdomen, with rigidity and tenderness. There was no vomiting. A blood-count an hour later showed 9600 leucocytes. Pain and tenderness at this time had increased, and also the rigidity. Temperature was 100° F.; pulse, 110; respirations, 24. At 11 P.M., four and a half hours after the onset of pain, operation was undertaken by Dr. Mitchell in the absence of Dr. Le Conte. Ether was administered, and a three-inch incision made in the right semi-lunar line below the umbilicus. A slight amount of turbid fluid escaped. One foot from the cæcum a large necrotic ulcer was seen, with a small perforation about the size of the head of a pin, from which a small amount of gas was escaping. Very little lymph was present, and no attempt at walling off. The perforation was inverted with two rows of Lembert sutures, abdominal cavity washed out with salt solution, and a gauze wick inserted in the pelvis and another at the site of perforation; wound partially closed with through-and-through silkworm-gut sutures.

After operation reaction was good; no vomiting; temperature rose rather rapidly to 104° F. and then subsided gradually, so that by the seventh day it reached normal for the first time. The abdomen continued soft without distention. Bowels moved with enemata. Packing was finally removed on the eighth day after operation. After the temperature had been normal for ten days there was again a rise, with signs of a relapse of fever. This continued for sixteen days, during which time he received thirty-four spongings, when the temperature was 102° F. and over. Convalescence is now again established.

The successful results obtained in these two cases are unquestionably due to the fact that both patients had more or less classical symptoms of perforation. The diagnosis having been readily and quickly made, operation speedily followed.

In the first case the man said that for some hours he had had abdominal pain. This pain must have been slight, for it was not sufficient for one of his race and nationality to speak of it until several hours had passed; then the pain became severe, and

shortly afterwards signs of collapse were present, with subnormal temperature, rapid, weak pulse, rapid respiration, profuse perspiration, and anxious facial expression. From the onset of the symptoms of collapse three hours and a half intervened before operation.

In the second case the first sign of perforation was sharp pain immediately after a tub bath, which was quickly followed by rigidity, tenderness, and a relatively high leucocyte count, a fall in temperature, and a rise in the pulse-rate. From the onset of this pain four hours and a half elapsed before the operation was undertaken. In neither case was there any attempt on nature's part at walling off the perforation from the general peritoneal cavity. In both cases the perforated area seemed to be in contact with the parietal peritoneum. It is known that the parietal peritoneum is very much more sensitive and reacts more quickly to an irritant than the visceral peritoneum, and it may be that in this fact there is a reason why some of the cases immediately present classical symptoms of perforation, while in others the onset is so gradual that the diagnosis cannot be made until the patient is practically beyond operative relief. Given a perforation which is surrounded by coils of intestine or covered by omentum (the least sensitive portions of the peritoneal surface), it might be hours or even days before the inflammation extended to the parietal peritoneum, with the appearance of severe pain, rigidity, and marked tenderness. The reporter had observed—but on this point he was not entirely certain—greater pain, tenderness, and rigidity of the abdominal wall when an inflamed or perforated appendix is in contact with the parietal peritoneum, and that the symptoms are much less marked when such an appendix is surrounded or walled off by intestinal coils. This suggestion was made only as a possible explanation for the slow and gradual onset of symptoms sometimes observed in perforating cases. When a condition of profound toxæmia is present, one would naturally look to this for a masking of the abdominal symptoms.

DR. J. ALISON SCOTT confessed his inability to diagnose perforation on all occasions. He had made a careful study of many of these cases at the Pennsylvania Hospital, and finds that they do not show any one thing that is diagnostic of perforation. Neither temperature, pulse, nor respiration is constant. Rigidity, pain, and the symptom complex are most to be depended upon.

Something in the appearance of the patient that can hardly be described is often suggestive. And yet all these points may be demonstrated in a patient and operation reveal no perforation. However, it is better to make this mistake occasionally than to let cases go unrecognized.

DR. JOHN H. GIBBON said that he was convinced that perforation of the large bowel is more insidious and presents more difficulty in diagnosis than does a like condition in the small intestine. He cited a case of perforation of the sigmoid in which adhesions had formed. When the abdomen was opened there was escape of gas, but only a small quantity of fluid was present. The perforation was exposed only when the sigmoid was separated from the abdominal wall to which it was adherent. Dr. Gibbon said that he felt that local anæsthesia was not so popular in Philadelphia as in some other cities, but it worked very satisfactorily in the above case. The man was very ill and delirious, and he decided to open the abdomen under cocaine and determine if perforation had occurred, and then employ ether if necessary. No pain was complained of until the sigmoid was dragged upon, and then ether was given. A series of seven cases of perforation operated on under local anæsthesia with three recoveries, which is reported by Hays, of Pittsburg, speaks well for this method of anæsthesia. One can trust to cocaine for exploratory incisions if one-fourth grain of morphine be given hypodermically fifteen minutes before operation. If prolonged operation is found necessary after the exploratory incision, ether can be given. Dr. Gibbon then discussed the treatment of threatened perforation in cases that are being operated upon. He has lost two patients from secondary perforation,—one on the second, the other on the tenth day after operation for the first perforation. In the first case the second perforation occurred promptly after the first, but in the second it was not suspected until shortly before death. At the operation only one ulcer seemed in imminent danger of perforation, and it was inverted. Autopsy showed that one had perforated which had shown no signs of it at the time of operation ten days before. In the second case an ulcer seemed on the point of perforating, but it was situated so near the ileocæcal valve and the surrounding tissue was so friable that attempts at inversion were unsuccessful. An expedient which will not be again used was then employed. It consisted in wrapping the omentum around the intestine in

such a manner as to cover the weakened area, the enveloping structure being held in place by a gauze pad. Perforation, as stated, occurred on the second day, before sufficient adhesions had formed to prevent the escape of the intestinal contents. Better results would no doubt have been secured had the gauze been placed next to the intestine or had the omentum been sewed to the intestine. One of the latter plans will be adopted in any future similar case.

DR. WILLIAM J. TAYLOR believes that the mortality in operations for typhoid perforation is in direct proportion to the size of the opening in the bowel. In two cases which he operated upon early, within one and one-half hours after perforation was diagnosed, there were large openings in the intestines and profound infection of the peritoneal cavity. Cases ending in recovery generally have small openings and but a comparatively slight amount of fluid in the belly. This fact urges early operation in cases of perforation.

DR. JOHN H. JOPSON cited a case corroborating Elsberg's statement that the symptoms of perforation in a child do not differ from those of an adult. He operated upon a child of six years, one of the youngest patients on record, who was admitted to the hospital twenty-four hours after perforation had occurred during the third week of the disease. The child had severe abdominal pain, vomiting, etc., in fact, being sent in as a case of peritonitis. When seen thirty-six hours after perforation the symptoms were typical, differing in no way from those seen in the adult. The child lived three days after operation.

DR. WILLIAM L. RODMAN agreed with Dr. Scott that there was no one characteristic symptom or sign of perforation. He also believed that rigidity and pain, with the addition of a sub-normal temperature, are the most reliable indications. Considering the present difficulty in diagnosing perforation itself, it does not seem that Cushing's suggestion of operating in the pre-perforative stage can be attempted. We must be further along in the matter of diagnosis before doing that, however desirable it may be. When in doubt regarding the presence of perforation, Dr. Rodman advises exploratory incision under cocaine. He has used this in two cases, one of which he was sure was hæmorrhage instead of perforation. He operated at the solicitation of two medical colleagues, and found blood in the bowel but no perfora-

tion. This finding was confirmed by autopsy, death occurring later from a second hæmorrhage. He recovered from the operation, and would have probably recovered but for the second hæmorrhage. An interesting feature in this case was that the medical men were misled by the leucocytosis present. Dr. Rodman emphasized the fact that the sooner we operate in these cases the better are the results. Statistics regarding the result of operation are becoming better because surgeons no longer wait for the subsidence of shock. As in gunshot wounds of the intestine, we should operate at once and not wait too long. He has operated on but one case, and recovery followed, though thirty-seven hours had elapsed since perforation and general peritonitis were marked. As to Dr. Taylor's statement regarding the size of perforation, the end of a finger could be put in the opening in this case. It was true, however, that not a large amount of fluid had escaped, the presence of lymph and the adherent omentum preventing great extravasation into the peritoneal cavity. Regarding local anæsthesia, Dr. Rodman said that the abdomen can be opened without giving the patient much pain. The intestines can be handled quite freely without causing pain, pinching the parietal peritoneum with forceps causing the greatest discomfort. He has performed one laparotomy under anæsthesia induced by carbolic acid alone, cocaine not being employed.

DR. R. P. McREYNOLDS has operated upon five cases of typhoid perforation; in four the diagnosis was made too late and death resulted from general peritonitis. In two cases coming to autopsy the operative result was good; the perforation being entirely closed. In one case, when the perforation was closed, the omentum was stitched over the ulcer in order to reinforce, and at the same time to prevent adjacent ulcers from perforating. The leucocyte count in these cases was misleading; in the last case it was only 8900, and for this reason we were not urgent enough for immediate operation. If we depend upon the leucocyte count alone, we will lose our patients. We thought the question of consultation to be an important one. If medical men see the case first and then send for the surgeon much valuable time is lost. In hospitals it would be better to send for a surgeon as soon as a typhoid fever patient shows any sign of perforation, and if he thinks an operation is indicated go ahead at once without waiting for a consultation.

DR. FRANCIS T. STEWART gave a brief analysis of eight cases of perforation in typhoid fever operated upon by him with two recoveries. Six were males, two females; ages varied from nine to forty-two years; the period of the disease varied from the thirteenth day to the fifth week; the time of operation after perforation was three, twelve, twelve, fourteen, nineteen, and forty-eight hours respectively in six cases, the other two being unknown. The first and one of the last two recovered. Many of the following statistics refer to six cases only, as but little was known of the other two. There was previous abdominal pain in two, none in the others; all had pain when perforation occurred; there was tenderness and rigidity in all; vomiting was absent in five; the temperature fell in one, rose in one, remained unchanged in four; pulse and respiration were accelerated in all; seven had distention and thoracic breathing; liver-dulness and dulness in the flanks were absent in six; the leucocyte count in four cases was respectively four, seven, ten, and eighteen thousand; the perforation in all was within three feet of the ileocæcal valve; the size of the opening varied from that of a pinhead to a quarter-dollar; free fluid was found in the abdomen of each, being clear in one; in only one was there any attempt at walling off the perforation by adhesions; two of the patients had been walking about until the occurrence of perforation; four were admitted as emergency cases, four were in the hospital when perforation occurred; ether was used in seven cases, cocaine in one. Dr. Stewart does not agree with Dr. Gibbon regarding the use of local anæsthesia in these cases, but prefers ether. Cocaine for exploratory incisions is of value, but for treatment is not satisfactory, as good work cannot be done upon a frightened, struggling patient. In addition to this point, the abdomen cannot be properly cleansed when only cocaine is employed. Drainage was employed in seven of the eight cases reported; in one the peritoneum seemed normal; drainage was not employed, and the patient recovered; none of the patients had a chill at the time of perforation; the Hippocratic facies was present in six, being absent in the two that recovered; auscultation was negative in seven, peristalsis being present in one of the patients that recovered; the diagnosis of perforation was made in five and the incision made in the right iliac region, the median incision being

used in the others, in which a diagnosis of perforative peritonitis was made.

DR. JAMES P. HUTCHINSON has seen the diagnosis made and operation performed in twenty cases of perforation in typhoid fever. Generally speaking, physicians are not inclined to call a surgeon in these cases as early as the latter would like. In doubtful cases operation should be performed, as those patients not suffering from perforation are not harmed by the exploratory incision. Dr. Hutchinson does not agree with Dr. Taylor regarding the effect of the size of the opening in the intestine. The peritoneum is more tolerant in patients having typhoid fever than is generally supposed. He believes that there is in every case a small perforation first, and that the opening gradually becomes larger. In some of the cases seen there was reason to believe that as many as four days had elapsed before symptoms became pronounced. He believed that perforation had been present in many cases longer than usually supposed, and during the most of this time the presence of faecal matter has been withstood. Ether is considered by Dr. Hutchinson to be the best anæsthetic. It does not do as much harm as the fright when local anæsthetics are employed. A large part of the time taken by these operations is employed in washing the abdomen, and during this period the ether can practically be dispensed with. In cases of perforation where there is not a large amount of fluid and the infection is distinctly limited, the area should simply be wiped with gauze and not flushed; flushing will carry the infection throughout and make the condition worse.

DR. LE CONTE, in closing, referred to the condition mentioned by Dr. Gibbon where a considerable area of inflamed bowel is present with a number of suspicious ulcers threatening perforation. In the presence of such a condition he did not believe it wise to invaginate with sutures these suspicious ulcers, or to cover them with omentum, as there was grave danger of their breaking down. He preferred to isolate such areas of the intestine from the general peritoneal cavity with walls of gauze, and to permit the ulcers to perforate if they would do so. A case was cited in which a dozen highly inflamed and thin areas were present in the last two feet of the ileum and in the cæcum, in which this entire area was isolated from the rest of the peritoneum by gauze. Within forty-eight hours some of these ulcers perforated with the

formation of fæcal fistulæ. These fistulæ closed spontaneously in three weeks, and the patient recovered without further operative treatment.

HERNIA FOLLOWING OPERATION FOR APPENDICITIS.

DR. WILLIAM J. TAYLOR presented a man, aged twenty-six years, always healthy and strong, except for an attack of appendicitis six years before. From this he made a complete recovery, and had no symptoms of recurrence until October 2, 1901, when he was seized with acute pain in the right side. Two days afterwards he was operated upon, and believes the appendix was removed and no pus was found, as the wound was closed without drainage. The sutures were removed on the fifth day, the wound apparently perfectly healed, and he remained in bed about five weeks to insure absolute closure of the wound. When he got up he wore a bandage with a pad over the site of the wound.

Towards the end of December, or nearly three months after this operation, he first noticed a little bulging at the lower angle of the wound; this gradually increased, in spite of wearing the bandage, until a very distinct and well-developed hernia resulted. He had a good deal of pain and discomfort, and for three or four weeks before he was seen by Dr. Taylor had almost constant pain. When he presented himself, there was a well-developed hernia about the size of the closed fist, which could not be entirely reduced. It was directly over the wound, and had dissected under the skin latterly towards the flank. An opening in the belly wall about an inch in diameter could be distinctly demonstrated.

On January 14, 1902, or fifteen months after the original operation, an incision was made to the outer side of the scar, and the hernial sac exposed. An opening was found about an inch in diameter in the belly wall; to this was adherent omentum and bowel, which were both anchored outside of the belly cavity. There was an immense number of adhesions everywhere, and the omentum had to be dissected away with great care. The hernial sac and its surrounding fibrous tissue were taken away also. The edges of the opening were freshened, the layers of the belly wall dissected loose, and three layers of suture were placed in the deeper tissues. The wound was then closed by interrupted silkworm-gut sutures, about six strands of silkworm gut intro-

duced in the wound for drainage. The wound came together nicely, but there was a fair amount of tension on the stitches.

In the opinion of Dr. Taylor, undoubtedly at the time of his first operation a stitch had given way, or else the closure of the wound was not sufficiently accurate. The patient says that he vomited excessively after the operation, and a small portion of the omentum was forced out in the incision and caught. Along this path the hernia developed.

The reporter stated that he had seen quite a number of cases of hernia following abdominal operations, and had operated upon a number of them. In all instances there has been a portion of omentum, and at times bowel anchored outside of the belly cavity and attached by adhesions to the hernial sac.

This explains the extreme difficulty of complete reduction in most of these cases, and also the discomfort produced by any form of truss or bandage. For this reason he would urge very strongly that operation be done and a definite closure of the opening in the belly wall made in all of these cases. A hernia through the belly wall which gives any discomfort ought not to be allowed to remain for any length of time without an attempt being made to close the opening by operation. The after results in this case were perfect. His recovery was uneventful and uninterrupted.

DR. WILLIAM L. RODMAN cited a case which had been a source of surprise to him. He operated upon a clean case of appendicitis, using the gridiron incision, securing primary union; but the patient returned some time later with a large ventral hernia. Why it occurred is not understood, as the layers were sutured separately with kangaroo tendon and chromicized gut. The patient attributed the hernia to a fall which she received a few weeks after operation. It has been said that hernia cannot occur after the gridiron operation, hence this case is put on record. In many such operations it is the only hernia he has seen where primary union was secured.

DR. ROBERT G. LE CONTE said that in closing an abdominal wound without drainage he always used through-and-through sutures of silkworm gut, with catgut to unite the layers of the fascia, and had never had a hernia follow this method of closure. The approximation of the fascia is of much more importance than that of the peritoneum.

NECROSIS OF ENTIRE LOWER JAW.

DR. ROBERT G. LE CONTE exhibited a lower jaw which he had removed that day from a child four and a half years old. Two weeks previously the child was said to have been perfectly well. The trouble began with pain in one of the teeth on the right side of the lower jaw. This was speedily followed by swelling of the right side of the face, fetid breath, discharge from the mouth, and high fever. When seen the child was almost in a typhoid condition, with great swelling of the right side of the face, temperature 104° F., a gangrenous condition of the alveolus, fetid breath, etc. On a hasty examination the case was thought to be one of noma, but after ether had been given it was found that the whole lower jaw was the seat of a fulminating, gangrenous osteitis. The mucous membrane covering the mental portion of the jaw was incised within the mouth, the jaw divided, and each half removed separately with sequestrum forceps by aid of very light traction. The cavity remaining was then curetted and the gangrenous tissue cut away with scissors, hæmorrhage being controlled by iodoform gauze packing. The patient's condition is most serious from systemic sepsis.

TRANSACTIONS

OF THE

CHICAGO SURGICAL SOCIETY.

Stated Meeting, November 2, 1903.

The President, E. WYLLYS ANDREWS, M.D., in the Chair.

RESECTION OF THE KNEE FOR TUBERCULOSIS.

DR. WILLIAM HESSERT exhibited a young man who had been suffering with a tubercular knee since childhood. For many years he had been under treatment by different physicians. His knee was intermittently involved, considerably swollen, and useless, while at other times he was able to get around. About two years ago the knee became considerably worse again and patient was more or less disabled. He was subjected to local and general treatment, including rest, the application of plaster casts, hot-air treatment, etc., all of which were of no avail. A year ago the knee was very much swollen and exquisitely tender. The swelling was fusiform, presenting the classic symptoms of a typical tubercular knee. A typical resection was made, the flap with convexity upward. The patella was sawed transversely, laid up and down, crucial ligaments severed, and a complete arthrectomy was done. The ends of the bones were sawed off about half an inch. There were two foci of necrosis, one in either tuberosity, which had to be scooped out with a sharp spoon. He did not wish to sacrifice any more bone than was necessary. After thoroughly dissecting out all of the tubercular tissue, the bones were drilled, a heavy catgut ligature drawn through, and the bones brought together. The capsule was reunited and the skin incision sutured, leaving a small drain of gauze on either side. A cast was applied for three weeks, after which it was renewed for another three weeks. While patient was wearing the second cast he was up and around and doing things around the house.

The shortening was a little more than an inch. The result was an excellent example of a knee resection. The young man is very active, walks, runs, and climbs stairs with the greatest agility.

UMBILICAL HERNIA.

DR. HESSERT showed a woman upon whom he operated for umbilical hernia, from which she had been suffering for nearly twenty years. At first the hernia was small, but of late it had assumed increased proportions. For the last few years it was irreducible; it was about the size of two fists; the pedicle was twelve inches in circumference. The wearing of a large abdominal supporter had caused so much irritation as to induce attacks of cellulitis in and about the sac. Patient was reduced to such a condition that she was almost unable to do any work. The hernia was rather tender, partly tympanitic, and partly dull on percussion. A typical Mayo operation was performed.

The wound healed by primary intention, and the woman made an excellent recovery. She still wears an abdominal supporter, owing to the pendulous condition of the abdomen. The distance from ensiform to pubes was reduced three inches by operation.

APPENDICITIS WITH SEVERE COMPLICATIONS.

DR. HESSERT presented a third case, one of appendicitis. The patient was a woman who had not had a previous attack. She suffered from severe pains in the abdomen, with vomiting and fever, for a week, but kept on doing her housework. She finally called in a physician on the seventh day after the onset of the attack, because at this time she suddenly had most severe pain in the right iliac fossa, radiating all over the abdomen, but chiefly focussed in the right iliac region. This was accompanied by vomiting, high fever, and collapse. The speaker saw the patient on the seventh day, the case having been referred to him by Dr. W. A. Breringer. Her pulse at this time was 106, temperature 104° F., and she was in a collapsed condition. The abdomen was tender; nothing definite could be made out except a point of tenderness in the right iliac region a little internal to the anterior superior spine. A diagnosis of perforative appendicitis was made, but her condition was such that it was not deemed wise to operate at once.

He therefore instituted the treatment advocated by Ochsner, namely, withholding food, gastric lavage, giving no opiates or cathartics, etc. The patient was much better the next day, in that the pulse had declined to 120 and temperature to 102° F. He then operated and found that the appendix had ruptured, with a concretion in the free peritoneal cavity not far from the appendix. Some free pus around the appendix. The appendix was posterior to the colon, lying on the iliacus muscle, and was removed with difficulty, owing to the shortness of its mesentery. It was removed, and the stump inverted with fine silk suture. Drainage with gauze and rubber tube. After the operation patient left the table in good condition. But for the first week following the operation her temperature did not decline; it ranged from 101° to 103° F. While her general condition had improved, she still had pain, which became localized in the lower lumbar region, so that an examination showed the development of a mass anterior to the kidney and below the liver, and probably behind the colon. On the seventh day after the operation there was a profuse discharge of pus from the original wound, and by making a bimanual palpation over the lumbar mass, pus exuded from the operation wound. She was taken to the operating-room and a lumbar incision made similar to the Simon kidney incision, and a large amount of pus evacuated. There was considerable granulation tissue which had broken down, and several abscess cavities were evacuated. Even after this the patient's temperature did not decline. The abscess was not entirely retroperitoneal, however, as the border of liver was visible. That night her temperature was 105° F., and her pulse very much accelerated. Within the next ten days she got along fairly well, and the wounds drained nicely, large amounts of slate-colored pus escaping. Later, patient developed shortness of breath, accompanied with a hacking cough. Dulness developed in the right lower chest, over which region the respiratory sounds were absent, with the other physical signs of fluid. Exploration showed the presence of pus, so that on the twenty-seventh day after the first operation the ninth rib was resected in postaxillary line, and considerable fetid pus removed. The patient's temperature that night rose to 106° F., pulse 140. She had lost weight and was almost reduced to skin and bone. She was in a typically septic condition. But she was stimulated and fed, and she rallied and was getting along fairly well, running

a septic temperature, although the short hacking cough continued. Ten days later she suddenly coughed up about a cup and a half of fetid pus, showing that she had had an abscess of the lung which had ruptured into a bronchus. She collapsed, and it was thought she would die; but after swaying in the balance for two or three days between life and death she finally rallied and got along fairly well again. All this time her pulse ranged from 120 to 160; temperature ranged from 102° to 106° F. Two weeks after this, there being considerable dulness of the right lung, and it being difficult to diagnose the exact condition, owing to the thickened condition of the pleura and partial consolidation of the lung, the resection wound having previously healed, and cavity having granulated up, the upper right chest filled with pus again, the heart displaced to the left side, left chest practically negative, so an aspirator was inserted into the sixth right interspace in anterior axillary line and pus was discovered. Under Schleich anaesthesia the speaker did not resect a rib, but went through bluntly and inserted a tube, evacuating a large amount of pus. This abscess cavity was separate and distinct from the previous cavity. Patient was in an extreme condition, but finally rallied, and after being in the hospital for three months she eventually recovered. The patient was exhibited, well and strong, having regained all of her former weight. To summarize, there was a perforation of appendix on seventh day, appendicectomy and drainage next day. Twelve days later lumbar abscess drained. Fifteen days later empyema of same side drained by resection of rib. Ten days later pulmonary abscess on same side coughed up. Fifteen days later another empyema higher up was drained.

INTERSCAPULOTHORACIC AMPUTATION FOR SARCOMA OF THE SCAPULA.

DR. A. E. HALSTEAD exhibited a man, fifty-seven years of age, who consulted him about the middle of September of this year in regard to a swelling on the shoulder. He gave the following history: About a year ago a horse struck him with his teeth on the shoulder, but did not break the skin. A couple of months thereafter the shoulder became painful. When patient came to see him about the 15th of September the swelling had been noticed for about three months. Both pain and swelling had gradually

increased. The swelling occupied the outer part of the scapula and shoulder-joint, the most prominent part of the tumor being just beneath the spine of the scapula. The characteristic sensations of crepitation imparted during palpation of the tumor suggested sarcoma. The introduction of an exploring needle showed only bright blood. He was operated at St. Luke's Hospital on the 21st of September. Dr. Halstead did a Paul Berger operation, saying that the first step was to resect the inner third of the clavicle; the second to ligate the subclavian artery and vein, the artery being tied first; and, third, to amputate the whole upper extremity. No hæmorrhage of any consequence occurred. The trunks of the brachial plexus were injected with a 2 per cent. solution of cocaine, so as to block the reflexes after the method of Crile. No shock followed the operation, the pulse remaining below 90 throughout. The wound healed by primary union. The patient was up on the third day and left the hospital on the tenth day after the operation. In this case resection of the scapula was considered, that is, removing the scapula and leaving the arm, but examination disclosed the end of the triceps to be invaded by the tumor. He said Drs. Zeit and Goldsmith had examined the tumor, and had stated that it was a mixed giant and spindle-cell sarcoma. The specimen he had prepared at St. Luke's Hospital showed a mixture of spindle, giant, and small round cells.

DR. ARTHUR DEAN BEVAN had done three of these operations. The first case which he did was gone over carefully by himself and several other physicians. The case presented itself as a tumor of the upper end of the humerus, and careful observation was made to determine if there was any primary focus anywhere else in the body. No such focus could be found anywhere else, and the conclusion was reached that it was a case of primary sarcoma of the humerus. He therefore made an amputation with that diagnosis. Histological examination showed that it was a carcinoma. The patient died four or five months after the operation, with symptoms of enlargement of the prostate, although the patient was a comparatively young man, only forty-five years of age. Careful examination showed the case was one of primary carcinoma of the prostate, and that the bone tumor was a secondary carcinoma.

A second case he exhibited to the Society last year. He had a very excellent X-ray view of it, and by a process of exclusion

it was believed that it was a primary sarcoma. Amputation was accordingly performed. The patient was a physician. Histological examination showed it was a sarcoma. The patient was still living and engaged in active practice.

A third case he operated upon last spring. The patient was referred to him by Dr. Herrick. She was a woman, fifty-eight years of age, who had evidences of peripheral neuritis as the first symptoms of the trouble; then a pathological fracture of the humerus. They went over the case carefully, with a view to excluding, if possible, primary carcinoma. They could not find any evidence of primary carcinoma, and with that view an amputation of the entire upper extremity was made. Histological examination showed, however, that it was carcinoma and not primary sarcoma. The woman had a recurrence, died, and a post-mortem examination was obtained. The full reports of the post-mortem examination he had not as yet received.

Recently, while in New York, he saw a case in which a surgeon had made an amputation of the entire upper extremity for sarcoma, and in which the sarcoma had recurred in the inner third of the clavicle which was left. In his third case, the woman to which he had just referred, the recurrence of carcinoma took place in the internal third of the clavicle. The first evidence of recurrence was in the inner third of the clavicle.

These two cases made him think it would be wise to do a little more complete operation in cases of amputation of the entire upper extremity and remove the inner third of the clavicle as well. It could be done. He did not think it would add much, if any, to the danger. In a case of primary sarcoma involving the shoulder-joint, one could imagine that it might early involve the clavicle and extend to the cancellous structure of the clavicle throughout the entire bone, and from this extension there would be some malignant tumor cells in the little stump of the clavicle left in the amputation.

The surgeon must be careful not to do what he himself had done twice, namely, amputate the entire upper extremity for secondary carcinoma. From his limited experience, he believed that many of these cases were secondary carcinomas, having a small primary focus elsewhere.

DR. A. J. OCHSNER said that one point of importance in connection with these operations was the relatively greater perma-

nency of the cure in cases of sarcoma of the upper end of the humerus in which this operation was performed. He had done the operation twice, once in 1891, for sarcoma of the shoulder involving the entire joint. The patient was well after twelve years. The other patient was operated on nine years ago for sarcoma of the shoulder, and was also well at this time. In amputations for the cure of sarcoma originating in the bone or periosteum, if the surgeon did not remove the joint beyond the point involved, there was practically always a recurrence. For this reason, in cases in which amputation of the upper portion of the humerus was made for sarcoma, there was a recurrence almost always, while in similar cases in which the arm together with the clavicle and scapula were removed there was likely to be no recurrence of the disease.

As far as the severity of the operation is concerned, he was surprised at the fact that both of his patients desired to sit up about the second or third day after the operation. One of them insisted on going to the bathroom on the second day after the operation. He had expected to find that these patients would show severe shock, but this did not occur.

DR. HALSTEAD, in closing the discussion, said he had had occasion to look up the statistics of this operation at the time he operated on this patient, but did not find them as favorable as the remarks of Dr. Ochsner would indicate. For instance, in Vol. xxxi of the *ANNALS OF SURGERY*, in which Fowler reported seventy-two cases of primary operation for malignant disease of the scapula, there were only five cases known to be well at the end of three years. One of these lived fifteen years, one five, which was probably an enchondroma. Schultz, in Vol. xliii of the *Deutsche Zeitschrift*, taking the cases operated on since 1875, found an operative mortality of 7.14 per cent., and definitive recovery in 10.71 per cent. From these two reports, which were voluminous and really included everything from the time Larrey first did the operation, the mortality is shown to be rather high and the percentage of permanent cures very small.

Dr. Halstead said that his own case presented some difficulty in diagnosis. The man had been anæsthetized, and an effort made to reduce a supposed dislocation of the shoulder-joint. This brought up the question of false aneurism or hæmatoma, which was excluded. The diagnosis was based upon feeling crepita-

tion, which he said was quite characteristic of myelogenic sarcoma. Furthermore, repeated examinations of the urine showed the presence of albumose, which is quite common in this particular form of sarcoma. This would not exclude osteomyelitis, but after introducing a needle into the tumor and nothing but fluid blood being withdrawn, osteomyelitis was excluded. This left only sarcoma to be considered.

THE PATHOLOGY AND TREATMENT OF RECENT FRACTURES OF THE PATELLA.

DR. S. C. PLUMMER, after considering the arguments for and against the operative treatment in recent fracture of the patella, proposed the following as a fair statement of the present status of the question of treatment of recent simple transverse fracture of the patella.

1. Operative treatment should never be undertaken except under the best of conditions for maintaining asepsis.

2. Presupposing ideal aseptic conditions, not every case should be subjected to operation, but only those in healthy patients of suitable age, with at least half an inch of separation of the fragments and lateral tears which compromise the "reserve extension-apparatus," or in patients following arduous occupations.

3. The operative treatment fulfils all the indications for treatment in a manner which the non-operative method can only partially achieve, but good functional results follow the non-operative treatment as a rule.

4. Early massage in all cases favors the early and complete restoration of function of the joint, and should be used in all cases.

5. If operative treatment is employed, the open arthrotomy should be used.

6. Absorbable suture material applied to the soft parts is sufficient in nearly every case.

DR. DANIEL N. EISENDRATH endorsed the conclusion of the essayist, that surgeons should not employ the operative treatment of fractures of the patella unless the surroundings were favorable, because a great many of the cases fell into the hands of general practitioners, and if it were to go forth from this Society that every case of fracture of the patella should be treated in an operative way, he thought the results would be disastrous.

Relative to the treatment by non-operative methods, if the surgeon remembered the pathology of fractures of the patella and applied this treatment to that pathology, almost as good results could be obtained by non-operative treatment as with the operative. The pathology was extensive tears in the aponeurosis as well as a break in the bone itself, with a great amount of effusion into the joint; and if the patient's limb were put up in a posterior splint, even though there was not exact coaptation between the fragments, with the use of massage applied regularly every day for the purpose of getting rid of effusion, etc., there would be recovery of functional capacity after three or four months. He could not quite agree with the statement of the essayist in advising the commencement of passive motion at the end of the fourth week. He called attention to a case which he exhibited to the Society last winter, where he had sutured the patella, accurate approximation having been obtained, yet passive motion was not begun until the end of the sixth week.

The ideal suture material for use in these cases was kangaroo tendon, because it could be put through the periosteum, if there was much destruction of the periosteum, and it had great tensile strength, but none of the irritating properties of formalized catgut.

DR. D. A. K. STEELE said it was difficult for the surgeon sometimes to decide which of the two methods of treatment to employ in different cases, the operative or non-operative treatment, and only experience would enable one to decide the point. He thought most surgeons had reached the conclusion that in the simpler transverse fractures of the patella, with a minimum amount of violence, the non-operative treatment should be employed. However, in cases of fracture of the patella due to direct violence, in which the soft parts had been materially injured, or where there had been a stellate fracture of the patella, the open method of treatment gave by far the best results. Where the joint was filled with blood-clots, where the aponeurosis was drawn over the end of the fragment, one would get bad functional results by the non-operative treatment. He would open the joint in such cases as early as possible, say the first day, or within two or three days after the accident, rather than wait later. He had used silver wire, also kangaroo tendon and chromicized catgut in these cases. He did not feel now that it was necessary to drill the frag-

ments and wire, or unite them with suture material through drilled holes. The selection of cases was necessary. There was no hard and fast rule. The English surgeons held fast to the non-operative treatment, and those who had had an opportunity to watch their results would see the bad results from non-operative or mechanical treatment; yet even with a wide separation of fragments it was astonishing to observe, after several months or a year, what the functional results would be. These results would be excellent, although there might be a separation of the fragments to the extent of half an inch, an inch, or an inch and a half. Such patients were able to walk, to ride horseback, and to use their limbs fairly well, but they had fibrous union. True bony union could be more certainly obtained by the use of sutures.

DR. WILLIAM E. MORGAN said it was his fortune last spring to have the care of two patients with similar complications. He brought these cases up because they had some bearing on the subject, as showing how surgeons were obliged sometimes to do things for the treatment of one fracture which they were not able to do for another.

A man was brought to the Mercy Hospital in the early spring with a fracture of the right thigh at the junction of the lower with the middle third or a little below that point. He had also a stellate fracture of the patella in the same limb. Within two months thereafter he had another exactly like it, but in the other leg. It was absolutely necessary for the knee to be placed in partial flexion for a time, in order to bring the fragments of the femur together. Any operative interference for patella was out of the question, because the patient was threatened with delirium tremens, and he did not dare to anæsthetize him. In this man's case he depended almost entirely on strapping for patella, using what he called oval straps, beginning low down on the leg, and gradually drawing up, in a manner which he indicated, then beginning high on thigh and strapping downward. When he came to the knee itself there was considerable bulging, with a tendency of the fragments to tilt upward; at the same time, the fragments were brought so closely together that there was little over one-quarter inch separation, and with his finger he felt that he was able to place the limb in a semiflexed position for the fracture of the thigh, without separating patellar fragments, then getting the

lower fragment of the femur so approximated to the upper that he felt sure of obtaining union. By straightening out the thigh by degrees, the patellar fragments came together. The man was laid up for about thirteen weeks before he was trusted to rise. The result in this case was excellent. There was union of the patella, fibrous perhaps, and he had a good useful thigh. Although there was some deformity of the thigh, with three-quarters of an inch of shortening, still he felt gratified with the result.

The other man left the hospital before he felt really safe in letting him about. He had not heard from him since; but examination of the patella before he left the hospital showed good solid union, and treatment was the same as in first case.

Some four years ago a man presented himself with both patellæ fractured, one thigh at middle, and a broken jaw. The results in the broken thigh and patellæ were good, but that of the jaw was poor, and he threatened to sue the hospital on account of the poor result obtained in the fracture of the jaw.

The speaker reserved operation as a secondary procedure in all fractures of the patella where it was not compound. His results from conservative treatment in ordinary fractures without operation had been just as good as from suturing. Therefore, he postponed the latter until he saw that useful union could not be obtained by the ordinary methods of dressings.

As to massage, he believed in it early; but he would a great deal rather have a man with a fracture of the patella come out with a stiff knee than have it too flexible. He would put off passive motion for a considerable time. He did not like to see it used short of six or eight weeks. As to active motion, from his own experience he would not permit the use of the knee-joint for at least ten weeks. If patients were permitted to walk too early, they were apt to use the knee too freely, and sometimes in going up and down stairs they might give it a sudden wrench, and if there was only fibrous union this would very likely be broken.

DR. THOMAS A. DAVIS said that the treatment of fractures of the patella was unsatisfactory without the open method in cases where there was some separation, say over half an inch, because of the intervention of the soft tissues, and it was impossible to predetermine the conditions without an external incision. In the

last two years he had a case of a patient who had sustained three fractures of the patella from indirect violence. In this case there was extensive interposition of the soft tissues, so that he could not expect firm fibrous union. The patient, the father of a senior medical student at the College of Physicians and Surgeons, came to the city from Minneapolis to see his son graduate, and in alighting from the train sustained a transverse fracture of the patella. He was brought to the hospital, and on examination it was found that there was separation of over one-half an inch; likewise considerable swelling of the joint. The speaker ordered a few days' rest, massage, and hot applications to the joint, and at the end of ten days he made a horseshoe-shaped incision and wired the patella with silver wire, after drilling through the fragments. In a month's time the patient was allowed to return to Minneapolis. Six months after he got home and had been attending to his business nearly all of his time, he was visiting a stock farm one Sunday, and, while in a stall examining a horse, the horse suddenly lurched over against him and he felt pain in his knee-joint. This did not prevent him from attending to his business. He came to Chicago six months later, and it was found that the function of the joint was not good. There was still a little swelling, although the patient had excellent control of the leg. At the same depôt, and under the same circumstances, he fractured his other patella. Much to the author's amazement, he found a separation of the fragments to the extent of from two and a half to three inches in the patella which he had first wired, also separation of three-quarters of an inch of the recently fractured patella. The treatment of this case presented a serious problem. Here was a man, weighing 225 pounds, with considerable separation of the fragments of one patella, and a recently fractured other patella, with separation. He concluded to operate on the recently fractured patella first. He placed the patient under the same treatment as he had given in the first instance. Ten days later he drilled the fragments and wired. In a week's time he found separation of the fractured ends to the extent of an inch. He anæsthetized the patient, and found that the silver wire he had used had broken. He had drilled four holes, put in two wires, and both pieces of wire were absolutely rotten. It was astonishing to him that this was not discovered before the wire had been used

by others in the hospital. He twisted the wire freely, tightened it, made very firm and close approximation, and it seemed at least strange afterwards that this wire should have broken and its friability was not discovered before. He put in more wire, and in two weeks' time, finding there was no separation or space, advised operation on the other patella, promising nothing. He was unable to get the fragments in anything like accurate apposition for wiring. Accordingly, he did a tendoplastic operation on the quadriceps extensor, brought the fragments into close approximation by freshening the edges of the bone, sutured with silver wire, and the soft tissues with catgut. The patient was now perfectly well and attending to business.

In operating on the first patella he found there was perfect union by the first wire; that there was no motion; and that if he had not done the operation on the quadriceps extensor he would not have found the first fracture. It was necessary to free the entire patella. He found silver wire two-thirds of an inch above the point of recent fracture, and on making a careful examination he found a little groove. But passing the knife in, he found there was firm calcareous union, if it was not true bony union.

The subject was interesting to him because he had seen a number of surgeons undertake immediate operation in cases of fracture of the patella, but he had never seen satisfactory results from the immediate operation. He had seen the knee-joint drained in two instances for infection after the immediate operation.

In regard to subcutaneous suture, it had many objections and nothing to recommend it. In the first place, it passed through the wounded tissue and exposed the wound to infection. In the second place, as it was impossible to determine the amount of soft tissue that might be in front, it afforded no better results than no operation.

He remembered several years ago investigating the subject of treatment of effusion into joints, and some Swedish or Norwegian surgeon reported a large number of cases to show that massage was sufficient in practically all cases to remove the blood-clots or blood, and afforded good functional results. The open treatment offered the same advantages.

DEMONSTRATION OF MCGRAW LIGATURE.

DR. A. J. OCHSNER stated that the use of an elastic ligature for gastro-enterostomy in which the pylorus was not completely obstructed either by carcinoma or cicatricial constriction, and also for making anastomosis between the intestines, was suggested by Professor Theodore McGraw twelve years ago, but was not used in the human subject until rather recently.

Regarding the speed with which it could be performed, one could calculate this from the amount of sewing that must be done. It was an operation that could be done as quickly as that by means of the Murphy button. So far as he could determine, it took about the same length of time. He had used the McGraw elastic ligature in forty cases. The effect on the patient was no greater than that following the use of the Murphy button. The advantage of the elastic ligature was practically the same as that of the Murphy button. The portion caught within the ligature sloughed away within a few days, and left a clean-cut opening between the two tubes. In the forty cases in which he had used it there had not been any peritonitis. Of this number, there were several that were not old enough to be counted. Three died, one two weeks after the operation, from exhaustion; another three weeks, and another in six weeks.

Before using this method he made an exploratory operation much more frequently than he had made it since. Since he had performed this operation, he had closed only very few cases, without making gastro-enterostomy, where there was pyloric obstruction; whereas formerly, whenever it seemed the patient could not possibly live more than a few weeks, he had closed the abdomen without doing anything. Theoretically, he believed that all mechanical means must ultimately be abandoned, and that surgeons must do all of these operations with the needle and thread. Practically, he had tried nothing that had been as satisfactory for making gastro-enterostomy or entero-enterostomy in suitable cases as this particular method.

DR. D. A. K. STEELE asked whether in any of the forty cases mentioned serious symptoms occurred from acute intestinal obstruction where the McGraw elastic ligature was used. He mentioned that recently a patient died in Rochester, Minn., from intestinal obstruction following the use of the McGraw elastic

ligature. Too long a loop of the jejunum was used, regurgitation occurred into the loop, and kinking occurred, the patient dying from acute obstruction, with persistent, uncontrollable vomiting, and even after the stomach had been washed out the regurgitation kept up. In this case the elastic ligature was passed through the jejunum transversely, including more than one-half of its diameter, which was an error of technique.

He said the objection to the elastic ligature and to the Murphy button was that these devices worked while surgeons were asleep. Personally, he liked to see the work finished. In any mechanical device that was used, one had to depend upon the element of time; it took hours or days for the elastic ligature or a mechanical contrivance to perform its function, which was somewhat uncertain.

He agreed with Dr. Ochsner in saying that ultimately surgeons would have to come to the use of needle and thread. The ligature, while it was quick and immediately satisfactory, so far as rapidity of completing the operation was concerned, had some disadvantages.

DR. E. WYLLYS ANDREWS said he saw Dr. Ochsner use the McGraw elastic ligature soon after the publication of Dr. McGraw's original paper, and he gave it a trial himself shortly thereafter. He had employed it in a dozen cases, with one death. The patient who died was one of his last cases. Two cases he had about a week ago, one of which died. He was disposed to be more enthusiastic than Dr. Ochsner with the somewhat limited experience that he had had with the ligature. In the use of the elastic ligature one had a device that was a little quicker and had some of the advantages of the Murphy button. It had the additional merit in that the surgeon did not have to lay open a hollow viscus which might infect the peritoneum. He had noticed that after the use of the ligature the patients came off the table in a good condition. The man who died, and was seventy years of age, who had been vomiting, had to be nourished per rectum for a week before the speaker operated on him. He was in a very bad condition. There was absolute pyloric obstruction, yet after the operation the patient came off the table with a pulse of 80, with no shock. This was his experience in nearly all of these cases. Most of the patients passed the ligature on the twelfth day, or earlier.

DR. ARTHUR DEAN BEVAN was interested in hearing a report of forty cases, with practically no operative deaths. This meant a great deal, and yet, when one turned to the work that had already been accomplished with needle and thread, the results were equally excellent. For instance, the admirable report of Moynihan, of seventy-six gastro-enterostomies, with only one death. He said Moynihan had made the statement that gastro-enterostomy could be performed with needle and thread in seventeen minutes. With these two facts to be weighed, and with his own limited experience in this work, he chose without any hesitation to do this work with needle and thread, and had not as yet used the McGraw ligature. He thought it was possible for surgeons to do the needle and thread operation with two continuous sutures, the first involving all the coats of the bowel, the second the Lembert, within five or six or eight minutes, as rapidly as could be done by the McGraw elastic ligature. According to the statistics of Moynihan, it could be done probably quite as safely, as far as the immediate mortality was concerned, and he thought with better prospects in regard to permanent benefit. One might in advanced carcinoma cases use a mechanical device which would shorten the operation six or eight minutes. This was the situation as it appeared to him, and yet he thought his opinion was not of much value, because he had had no means of comparing the McGraw operation from personal experience with the needle and thread method.

DR. OCHSNER, in closing the discussion, said that his own feeling was exactly that expressed by Dr. Bevan. Practically, he had never done anything in the way of gastro-enterostomy that was as satisfactory as it was by this method; but he had not theoretically come to consider it the final method. He had felt that if he could do the operation as well as Moynihan had done it with needle and thread, he would not use the McGraw elastic ligature, but he had never done it nearly as well.

With reference to the opening, he recalled one case in which there was an ulcer of the pylorus and an ulcer of the ileum about eight inches from the ileocaecal valve. After he had made gastro-enterostomy for obstruction of the pylorus, he did not examine other portions, and did not find the obstruction in the ileum. But the fact that there was obstruction became apparent later, so he made a second operation, and found a similar ulcer in the mesen-

teric side of the ileum to that which he had found formerly on the lower side of the pylorus, and with a similar obstruction due to cicatricial contraction of the ileum. He made anastomosis between the ileum and sigmoid above the stricture in the ileum. In this case he had an opportunity to examine the anastomotic opening between the stomach and jejunum. It was large. It would admit three fingers. He thought originally the opening was about seven and a half centimetres long. He said Dr. Walker, of Detroit, had made experiments upon dogs which bore out this observation.

Having made his openings at the lowest portion of the stomach and on the anterior wall, at least three inches in length, he had not had the form of obstruction to which Dr. Steele had referred. The case referred to by Dr. Steele, he said, was one in which Mayo made a Mikulicz operation with the elastic ligature. He put the ligature in obliquely, grasping a little more than one-half of the diameter of the jejunum, near the point where it came out from the transverse colon, and attached it to the posterior surface of the stomach, and so he virtually sewed up the intestine, because by tying the ligature it closed the intestine, and this gave the bile on the proximal side a chance to balloon it and cause necrosis.

The speaker said that his inclination has been against the use of mechanical means, and still he had used the Murphy button in preference to needle and thread in many cases because his results were better. Like Dr. Steele, he did not like anything that was working while he was sleeping; still, if more people got well from the use of these mechanical devices, then he would use them until he could use the needle and thread more dexterously and expeditiously.

REVIEWS OF BOOKS.

MODERN SURGERY, GENERAL AND OPERATIVE. By JOHN CHALMERS DA COSTA, M.D. Fourth Edition. Philadelphia: W. B. Saunders & Co., 1903.

Five years ago we presented a review of the second edition of this book. It seemed to us at that time that it filled no particular place, and simply added to the already large category of unnecessary medical publications. Of this fourth edition we shall have to say something different. It fills a place, and is a credit to the high class of surgical publications which the advancements of the time have made necessary. We have no greater criticism to offer than this: it is so unlike and so superior in every respect to the first edition that it should not be called an edition of the same book. The old book has had its defects revised out of it, and so much added and amplified that it is indeed a new publication.

The book before us is well written and satisfying. The text is modern. Indeed, there are references in the text to publications which had appeared but two months before the book was on the market. The value of the work is greatly enhanced by numerous references. There are valuable statistics compiled from the general literature, and quotations from the most recent articles published upon many surgical subjects. The whole work has a thoroughly up-to-date character.

The first chapter is devoted to bacteriology. This is brief but sufficient. The different germicidal agents are taken up and described systematically. There is an excellent description of the uses and character of corrosive sublimate.

Serum therapy is discussed in its relation to surgical diseases. The author warns against many of the unscientific and

sensational claims that are made for this treatment. "It is our duty to study, experiment, and observe, and to reach a conclusion only after honest, careful, and thorough investigation. A little scepticism is as yet a safe rule."

The chapter on asepsis and antisepsis is one of the best on this subject that we have seen. The subject of repair is well presented. The reparative method in each of the structures of the body is taken up separately. Under surgical fevers all of the fever-producing conditions are taken up separately. Besides the fevers ordinarily described, we find described the fevers of iodoform absorption, ptyalism or mercurial fever, fever of morphinism, fever of cocaine poisoning, hepatic fever, hysterical fever, emotional fever, etc.

The etiology of tumors is fully and judiciously considered. The recent discussions concerning the etiology of cancer are referred to, but no partisan position assumed.

We are glad to encounter in a text-book the statement that "the radical treatment of varix of the leg often does good, often relieves some annoying condition, but rarely absolutely cures." The truth of this will be more fully appreciated when surgeons follow for a longer time and make a more careful study of the later histories of these cases.

The operation of Matas for aneurism is fully described. Under the treatment of hæmorrhage, the author gives fifty rules for the arrest of primary hæmorrhage.

Bristow's reports of cases of evulsion of the brachial plexus are described. The section on cranial topography is worthy of note. Concussion of the brain is not made clear. Under the subject intracranial tumors we encounter the new, yet not generally accepted, view that "no region of the body is so liable to tumors as the brain."

The chapters on the surgery of the spine and the surgery of the chest are good. Fowler's paper on the surgical treatment of intrathoracic tuberculosis is freely quoted. Of particular value

is the chapter on abdominal injuries. After a general discussion of the diagnosis of abdominal injuries, the author takes up in order contusions of the abdominal wall without injury to viscera, then injuries with damage to the peritoneum or the viscera, then rupture of the stomach without external wound, and finally rupture of the intestine without external wound. These are given very practical treatment. Methods for the identification of the different segments of the bowel are given.

The author's views upon the subject of the operative treatment of appendicitis are the views which are now most generally accepted by American surgeons. Intestinal surgery is presented as one of the best features of the book. All of the best of the operations for gastro-enterostomy and intestinal anastomosis are described and illustrated.

Of the operations for hæmorrhoids the author favors the use of the ligature as the easiest and most generally useful.

Every anæsthetist should read the chapter on anæsthesia and anæsthetics in this book. It is a thoroughly up-to-date *résumé*. The preparation of the patient is fully discussed. The differences and the effects of ether and chloroform and the practical points in their administration are presented. The other agents, such as chloroform and oxygen, ether and oxygen, and the numerous other mixtures and agents, are described. A section is devoted to the treatment of the complications developing during the anæsthetic state. "Cocainization of the spinal cord," he says, "is not growing in popularity. It is regarded by most surgeons as rather a surgical curiosity."

Diseases and injuries of the thyroid gland and the surgery of the lymphatics are brought fully up to date. The references are to the very recent literature on these subjects. The same may be said of the surgery of the kidneys and bladder. Bristow's method of dilating the bladder with air for suprapubic cystotomy is endorsed.

The different methods of dealing with the hypertrophied

prostate are judiciously considered. The newer perineal operations are described.

The book closes with a chapter on amputations and a chapter on the X-ray as a diagnostic and therapeutic agent,—both good.

We have only these criticisms to offer: A vague thing or condition called "scrofula" is described to the detriment of the book. The impossibility of bony union in unoperated fracture of the patella and the constant presence of intervening clot and torn aponeurosis are not made clear. The picture on page 633 is a surgical caricature and an anatomical burlesque. Under the heading, "Effect of Bacteria upon Bacteria," we find this: "The streptococcus of erysipelas is antagonistic to the bacillus of anthrax and also to syphilis, tuberculosis, and sarcoma." Now, just what bacteria of sarcoma are meant here we do not understand, particularly as we believe that bacteria have nothing to do with sarcoma. The excision of chronically inflamed bursæ sacs is not mentioned.

These few things stand in such relation to the immense practical value of the work and its completeness as a surgical manual that they need be considered only as of small importance. The book is a credit to the author and publishers, and a stepping-stone towards the supremacy of American surgery.

JAMES P. WARBASSE.

CHIRURGIE DES OVAIRES ET DES TROMPES. Par A. MONPROFIT, Professeur de Clinique Chirurgicale à l'École de Médecine, Chirurgien de l'Hôtel-Dieu d'Angers. Paris: Institut International de Bibliographie Scientifique, 1903.

SURGERY OF THE OVARIES AND TUBES. By A. MONPROFIT, of Angers. Presse Scientifique International, 93 Boulevard Saint-Germain, Paris.

This excellent work is dedicated by the author to Felix Terrier, who has written a preface in which he felicitates the author upon the rare judgment shown in advocating conservative procedures and the courage in radical operations.

The book opens with a description of the older operations for cystic tumors of the ovary. The several methods of puncture and tapping are described with the histories of these methods. Among these operations which are of historic interest are described puncture and paracentesis, puncture with injection into the cyst, puncture and drainage, incision of the cyst after provoking adhesions to the abdominal wall, marsupialization, vaginal puncture, perineal incision, parasacral incision, and rectal puncture and incision. These methods are set forth in detail, and are given the same attention as though they were acceptable surgical procedures.

The author next takes up the modern conservative operations upon the uterine adnexa. The technique of abdominal section is carefully described, a great deal of attention being given to the instruments and appliances. Among these we find a self-retaining retractor, invented by the author, one blade of which fits in the vagina, the other, a broader blade, makes downward traction in the lower angle of the median abdominal wound. "*Quelle simplicité!*" the author observes after describing the method of placing it in position.

A section of several chapters is given to conservative operations upon the ovaries, in which many valuable operative procedures are described. It is in this chapter that the operation of intra-abdominal massage of the ovary is described, an operation which Terrier refers to in his preface as a manifestation of the march of surgery on the road of progress. In this operation the ovary is lifted into the wound and subjected to a gentle rolling massage between the fingers. The operation is applied in cases of congestion and chronic inflammation. The author has used it in a number of cases with good result.

Operations upon the tubes and ovaries by the vaginal route are well described. It is in this field that the French surgeons have excelled.

The second half of the book is devoted to the radical opera-

tions. Normal ovariectomy for the cure of extra-ovarian conditions he gives Battey the credit of first doing. When we come to the history of ovariectomy or cysto-oophorectomy, McDowell is not regarded as the pioneer. Robert Houston is the father of ovariectomy, the author claims. He shows that Houston, of Glasgow, did the operation in 1701, more than a hundred years before McDowell, and refers to an article by Finlayson in 1896, and to an article in the *British Medical Journal* in 1897, as authorities for the statement. The report of Houston's case appeared in *The Philosophical Transactions* (Vol. xxxiii) in 1726. The operation, he shows, was first suggested by Th. Schorkopoff in 1685. The medical historian will find some valuable information on this subject.

This book is a systematic treatise on the surgery of the ovaries and tubes. It is provided with a complete index; and a fine attention to system characterizes the work. The chapter on each disease is divided into parts falling under these headings: definition, synonyms, varieties, history, operations, results, indications. The historical considerations are especially full and valuable.

The work is well illustrated. Many of the pictures are original: the best are borrowed from Kelly.

JAMES P. WARBASSE.

A TREATISE ON ORGANIC NERVOUS DISEASES. By M. ALLEN STARR, M.D., Ph.D., LL.D., Professor of the Mind and Nervous System in the College of Physicians and Surgeons (Columbia University), etc. Pp. 742. New York and Philadelphia: Lea Brothers & Co., 1903.

It would be impracticable to epitomize the entire work of Professor Starr, as well as unfair to both author and book, but one or two points of excellence, especially such as appeal to the general practitioner, deserve mention. Possibly because of its showiness the localization of cerebral neoplasms and injuries is

always of paramount interest to physician, surgeon, and neurologist alike, and the chapters devoted to abscess and neoplasms, while brief, are excellent.

The diagnosis and localization of brain diseases—a most important section—receive somewhat more detailed treatment, the various subjective and objective symptoms being traced to their anatomical source. Not the least valuable portion of this chapter is the abundance of diagrams and plates; though for that matter these necessary adjuncts are unusually profuse and good throughout the entire volume, some being old friends, like the diagram of the “concept Bell,” but most being new. Professor Starr is fortunate in being able to draw from the anatomical preparations of the College of Physicians and Surgeons as well as from his own extensive material. An unusually large proportion of the plates are colored,—a distinct advantage.

The importance of ocular symptoms is duly emphasized in an interesting section and embellished with colored plates of the fundus oculi in health and disease. The cranial nerves are included in this chapter, which is one that will well repay careful study. While expertness in ophthalmoscopy can be reached by only a few, all should be impressed by the important aid that comes from an examination of the fundus and from alterations in the visual field, and should in all appropriate cases *early* avail themselves of experienced aid in this form of diagnosis.

The author furnishes a very acceptable chapter on apoplexy, one that should appeal to every one who has had this condition to deal with. After urging the imperative need for the exact determination of the cause and the location of the injury, he gives some thoroughly practical directions for the management of the case. Among other matters he urges the value of venesection when rationally employed, and condemns the routine practice of administering potassium iodide; quoting Carter to show that it does not affect blood-pressure, and hence is not indicated in arteriosclerotic patients. While it is by no means fair to judge

from a limited experience and is possibly presumptuous to question the dictum of such an authority, the reviewer feels that he must urge his belief that iodine is at least occasionally useful in patients with high tension arteries where nephritis is a complication, judging from a fall of twenty-five to thirty millimetres pressure with a corresponding increase in the amount of urine secreted under moderate doses of hydriodic acid. However, *exceptio regulum probat*.

Tabes dorsalis furnishes material for a well-written chapter. The arrangement by topics and the orderly grouping of the subject-matter together with the clear, terse style makes this, as most of the other chapters, very attractive reading. The favorable comment on the preceding chapters selected at random may be extended to the whole book, although there are one or two minor matters that might be criticised unfavorably were one so inclined. The index, for example, while good, is not so complete as it should be in a work of such importance. It has been objected that the consideration of a number of conditions is lacking in detail. While this may be a fault in the eyes of the neurologist, it seems from the view-point of the general practitioner to be abundantly ample for a text-book, for the principles of diagnosis and treatment are thoroughly emphasized.

HENRY GOODWIN WEBSTER.

CLINICAL PATHOLOGY OF THE BLOOD. A Treatise on the General Principles and Special Applications of Hæmatology. By JAMES EWING. Second Edition. New York and Philadelphia: Lea Brothers & Co., 1903.

In revising the first edition of this work, while Dr. Ewing has duly considered the advances made in hæmatology and has made additions to several chapters, he has made but few radical changes.

The work is divided into five parts. 1. General physiology and pathology of the blood. 2. Special pathology. 3. The acute

infectious diseases. 4. Constitutional diseases. 5. General diseases of viscera.

Each chapter is accompanied by an extensive bibliography, which greatly increases the value of the work to the advanced student.

To the surgeon the sections on acute infectious diseases and carcinoma and sarcoma are most important. The author states that "while the rule that suppuration induces leucocytosis is almost invariable, it must be remembered that leucocytosis may promptly disappear when the exudation ceases, and that suppurations involving mucous surfaces may induce very slight leucocytosis." In discussing the bacteriology of the blood, the author has not changed from the position which he held two years ago, despite the many convincing experiments of other workers. The reviewer does not believe that the evidence has been fairly presented by Dr. Ewing, and that he is not justified in drawing the conclusion that, "In the great majority of cases of local or general septic infection, septicopyæmia, septicæmia, pyæmia, diffuse suppuration, osteomyelitis, etc., bacteria are present in the circulating blood only for short periods and at frequent intervals, most frequently during chills. . . . In a very moderate number of cases of septic infection, especially those which are not attended by local abscess formation, the bacterial agent may be isolated from the blood during the progress of the disease."

In reference to carcinoma, it is stated that, in view of the variety and frequency of the complications of this disease, it is unwise to draw any narrow diagnostic conclusions from the presence or absence of leucocytosis. On the other hand, in sarcoma there appears a distinct leucocytosis which tends to persist and increase.

The work as a whole is admirably written. The illustrations are good. The arrangement of the text adapts it to the use of the student and general reader, for the theoretical discussions and

abstracts, etc., which interest the more advanced workers, have been put in fine print.

PAUL MONROE PILCHER.

TRANSACTIONS OF THE SOUTHERN SURGICAL AND GYNÆCOLOGICAL ASSOCIATION. Vol. XV. Fifteenth Session. Edited by W. D. HAGGARD, M.D., 1903.

This volume contains the papers and discussions and the minutes of the proceedings of the fifteenth annual meeting of this society, held at Cincinnati. The papers are of a high class, and deal with the questions uppermost in professional thought. The volume is well edited and does credit to the association and its editor.

The scientific work represented in the Transactions of this Society shows that it is entitled to take its place among the scientific societies of the world. The first subject dealt with is the Treatment of Hypertrophy of the Prostate. In the discussion of this subject, Dr. A. H. Ferguson presents the advantages of the perineal operation for the extirpation of the hypertrophied gland. The median perineal incision he declares to be the incision of the expert. The present status of the perineal operation, he says, shows about 200 cases operated upon with less than 5 per cent. mortality.

Dr. Joseph Taber Johnson's paper on the general subject of Gonorrhœa is followed by a discussion in which it is evident that there is a good deal of difference of opinion concerning this question, and, furthermore, that it is one of the most important subjects with which the medical profession has to deal.

Dr. George H. Noble has a paper, well illustrated, describing a Method of Suturing the Fascia and Levator Ani Muscle in Perineorrhaphy. He shows also a method of operating for complete laceration of the perineum, designed for the purpose of eliminating danger of infection from the rectum. The illustra-

tions of this paper would do credit to a text-book of surgery. It shows careful preparation and represents a high class of work.

The reviewer is attracted particularly by a paper by Dr. Hugh H. Young on the Surgery of the Lower Ureter. The author describes first the anatomy of the pelvic ureter; and then takes up separately each of the anomalies and diseases of this portion of the ureter requiring surgical treatment. These are prolapse, ureteritis, calculus, fistula, tumors, valve formation, and stricture. Seven cases are reported illustrating these conditions.

Able papers by Dr. Samuel Lloyd on Gastro-enterostomy with the McGraw ligature, Maurice H. Richardson on The Indications for Extirpation of the Gall-Bladder, A. H. Ferguson, G. H. Noble, and F. F. Simpson on Treatment of Retrodisplacements of the Uterus, J. S. Horsley on Posttyphoidal Disease of the Ribs, J. B. Deaver on The Treatment of Gall-Stones, and E. D. Martin on Spinal Analgesia, add interest and value to the volume, which closes with sketches of the lives of some of the eminent men of the South. There are excellent full-page copies of portraits of McDowell, Sims, Dudley, Warren Stone, Paul F. Eve, Haggard, McGuire, Bedford Brown, Robert Battey, David W. Yandell, William T. Briggs, Claudius Henry Mastin, Henry F. Campbell, Robert A. Kinloch, Albert B. Miles, and James T. Jelks.

JAMES P. WARBASSE.

INTERNATIONAL CLINICS. Edited by A. O. J. KELLY, A.M., M.D.
Vols. II and III, Thirteenth Series, 1903. Philadelphia:
J. B. Lippincott Company, 1903.

Of these two volumes, Vol. II contains a series of papers and discussions upon the summer diseases of children. There are also a paper by Dr. Opie on the symptoms and treatment of disease of the pancreas, and one by Dr. Deaver on the diagnosis and surgical treatment of disease of the pancreas. Another section of this volume is given to therapeutics, in which we find papers on Truncetek's serum in arteriosclerosis; practical notes on the pro-

phylactic and curative treatment of influenza, malaria, erysipelas, and ozæna; local treatment as a recent advance in therapeutics; and the rest treatment. Other sections are given to general medicine, surgery, pædiatrics, obstetrics, gynæcology, and ophthalmology.

Dr. Opie gives an exhaustive discussion of pancreatic diseases. The author first discusses the symptoms of the various lesions of this organ. These fall under the two heads of (1) symptoms which result from impairment of the internal function of the pancreas, and (2) symptoms which follow alterations of the external secretions. He also takes up the clinical significance of fat necrosis, acute hæmorrhagic pancreatitis, acute gangrenous pancreatitis, chronic pancreatitis, and pancreatitis as a complication of other diseases.

Dr. Deaver's paper is an especially valuable contribution to the surgery of the pancreas, and is illustrated with a large number of reports of cases.

The diagnosis and treatment of hæmorrhoids is discussed by Dr. Gay, who gives the practical methods of examination and diagnosis, and then goes on to the treatment. Many cases he insists do not require operation. The treatment by antiseptic astringent applications is advised in the mild cases. He also advocates the injection of carbolic acid in suitable cases. Other cases, without distinct tumor, are treated by the application of nitric acid. The usually employed surgical procedures are also described.

The most important surgical paper is that by Mr. Bishop on abdomino-pelvic diagnosis. This lecture deals with swellings, and is one of a series of lectures on abdominal diagnosis. The value of Jenner's test for the differentiation of tumors of the abdominal wall is discussed. Consideration is also given to the differential diagnosis of the various hernias.

Dr. Roncali has reported a lecture on the surgical relief of epilepsy, in which early and prompt operation for this condition is advocated.

Vol. III contains a symposium of medical and surgical papers on diseases of the gall-passages and gall-bladder. Dr. Musser's paper shows valuable temperature studies and reports of cases. He advocates cholecystotomy as the best cure for cholecystitis. A very valuable paper is that on the causation, symptoms, and diagnosis of gall-stones by Dr. Rudolph. This presents the subject in a very clear light.

Dr. Stockton's paper considers the diagnosis and treatment of cholecystitis from a medical stand-point. He insists that, while it is not only useless but reprehensible to delay the assistance which surgical intervention alone can bring to many patients, we are not yet in a position where it is proper to demand a cholecystotomy as soon as a diagnosis of gall-stone is made. The majority of patients, he says, can be greatly benefited by appropriate medical treatment, and many will recover by medical treatment alone; and he goes on to lay down a very rational line of treatment for these cases. We cannot see, however, how salol, sodium salicylate, aspirin, and antipyrin can have much effect on these cases. The surgical side of this question is discussed by Dr. Lejars and Dr. Deaver. Other surgical papers are on cocaine anæsthesia, general anæsthesia, asepsis and antisepsis, gastrotomy, concussion of the brain, intrascrotal tumors, and the modern treatment of varicose veins.

Each of these volumes contains a good index.

JAMES P. WARBASSE.

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